

Research and Development Program 2.4

**FY 1995  
Science and Technology  
Program**

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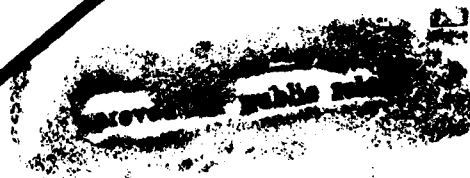
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13. ABSTRACT (Maximum 200 words)  This document describes the vision and strategy of ARI's FY 1995 Science and Technology program, with focus on its exploratory development (6.2) and advanced development (6.3A) research efforts. These research programs, described in detail in Appendices A and B, are in accordance with that described in the FY 1995 Army Science and Technology Master Plan.  ARI's Science and Technology program in Manpower, Personnel, and Training seeks to maximize human military performance. The goal of the Manpower and Personnel research program is to improve performance by assigning individuals to jobs for which they are best qualified, selecting and developing effective leaders, and ensuring support systems and career development opportunities to retain quality soldiers. The goal of the Training research program is to improve performance by providing the most effective and affordable strategies for individual and collective training for a wide variety of missions.					
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FOR THE BEHAVIORAL AND SOCIAL SCIENCES**

**FY 1995  
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PROGRAM**

**JULY 1994**

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*"...the Army must sustain the quality of its people while developing and implementing new doctrine, organizations, materiel, training, leadership development programs, and soldier support systems, all of which will facilitate a trained and ready Army able to meet global challenges today and into the 21st Century."*

General Gordon R. Sullivan  
Chief of Staff, U.S. Army  
*Army Posture Statement, FY95*

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## **FOREWORD**

This document describes ARI's FY 1995 exploratory development (6.2) and advanced development (6.3A) efforts in support of the Army's Manpower, Personnel and Training (MPT) science and technology (S&T) program. ARI's FY 1995 basic research program will be documented elsewhere. The full ARI program also includes a research-based study and analysis program (6.5-funded) which is documented in ARI R&D Program 3.3, FY 1995 Research-Based Personnel and Training Study and Analysis Program.

## **U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES**

ARI, a field operating agency of the DA DCSPER, is the Army's lead laboratory and developing agency for manpower, personnel and training (MPT) science and technology. ARI's S&T program is executed under the supervision of the DA Deputy Chief of Staff for Personnel (DCSPER), who receives broad guidance from the Assistant Secretary of the Army for Manpower and Reserve Affairs (ASA(M&RA)) and the Assistant Secretary of the Army for Research, Development and Acquisition (ASA(RDA)).

As specified in AR 70-6 and AR 70-8, the DCSPER directs and monitors the planning, programming, budgeting and execution activities of ARI in the conduct of its comprehensive MPT S&T program. The Director of ARI, under the staff supervision of the Assistant DCSPER (ADCSPER), exercises management oversight responsibility for planning and execution of the ARI S&T program. As a developing agency, ARI's program is governed by DCSPER guidance and the provisions of AR 70-1, AR 70-6 and AR 70-8.

## **INTRODUCTION**

### **Army Manpower, Personnel and Training (MPT) Science and Technology Vision**

A high quality soldier represents the basic element of America's Army. Each must be assigned to the job that best fits his or her unique set of abilities and must be provided the best training possible. Soldiers, leaders and their units must be prepared to deploy rapidly, fight upon arrival, and win, in a wide variety of contingency operations.

The Army will focus on warrior preparation to ensure that each soldier and unit is part of a Total Quality Force before a conflict begins. The right individual will be in the right job at the right time. Leaders will be identified early and their professional development as warfighters and as leaders assured. Research-based training strategies will ensure that the Army's investments in simulated training environments and other expensive training resources (including training personnel) provide trained soldiers and units at affordable costs.

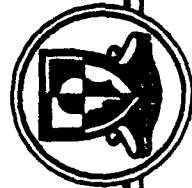
### **Army MPT Science and Technology Strategy**

ARI's plan for its science and technology (S&T) program is based on the Army leadership's vision of the future Army, as constrained by realistic funding limits. ARI's S&T planning process is shown in Figure 1. The ARI S&T program consists of research tasks performed by ARI research units in Alexandria, VA, as well as research units in the field throughout CONUS. ARI's FY 1995 program structure is summarized in Figure 2.

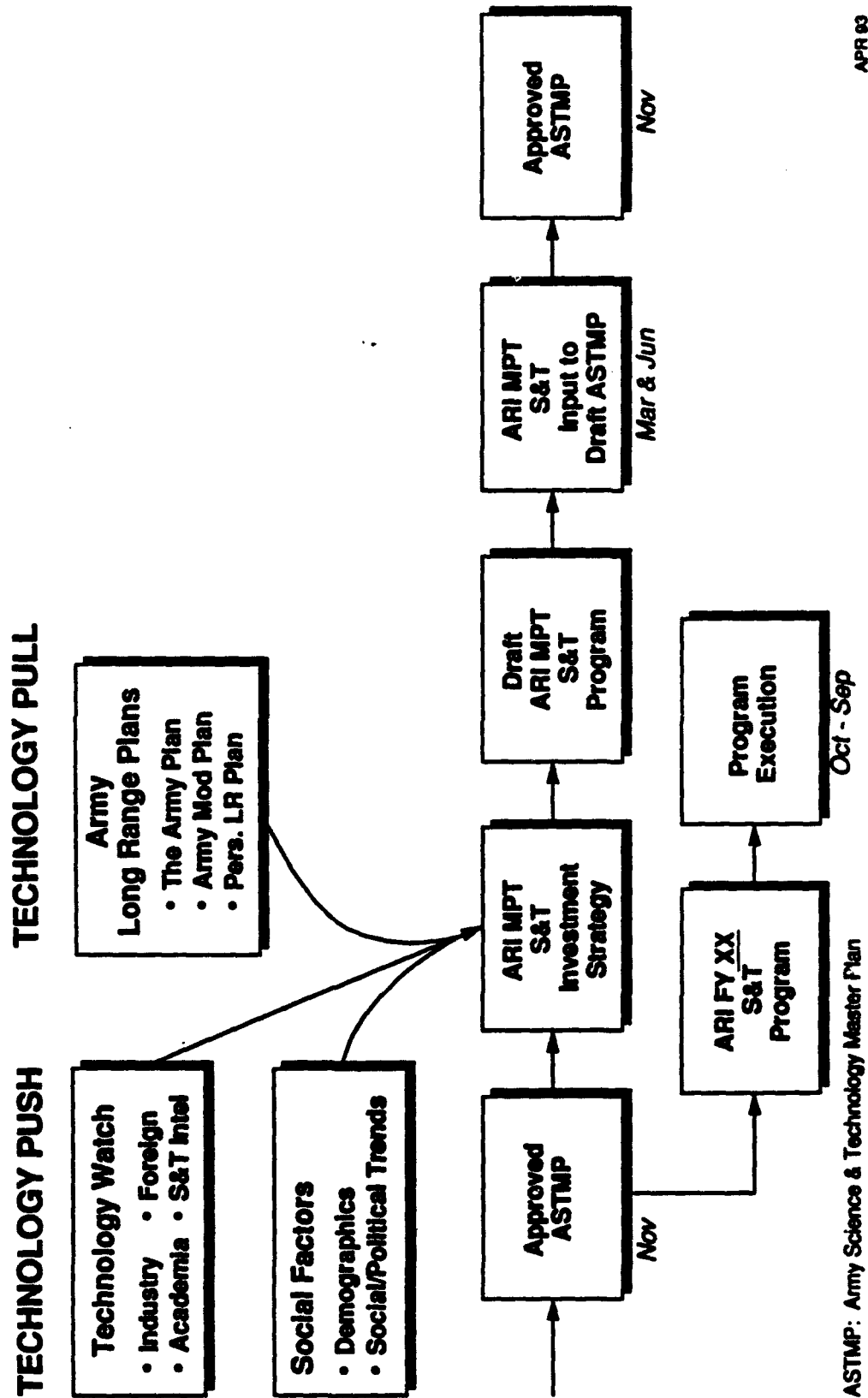
**Army Modernization Plan:** ARI's S&T plan is consonant with the Army's Modernization Strategy and Plan, in which the Army Chief of Staff established five strategic objectives:

- \* Project and Sustain the Force
- \* Protect the Force
- \* Win the Information War
- \* Conduct Precision Strikes
- \* Dominate the Maneuver Battle

These objectives are described in the Army Modernization Plan (AMP) prepared by the Office of the Deputy Chief of Staff for Operations and Plans. The AMP formally states the Army's funded plans for force development and modernization and is the key document that assists in focusing and disciplining research, development, and acquisition efforts over the long term.



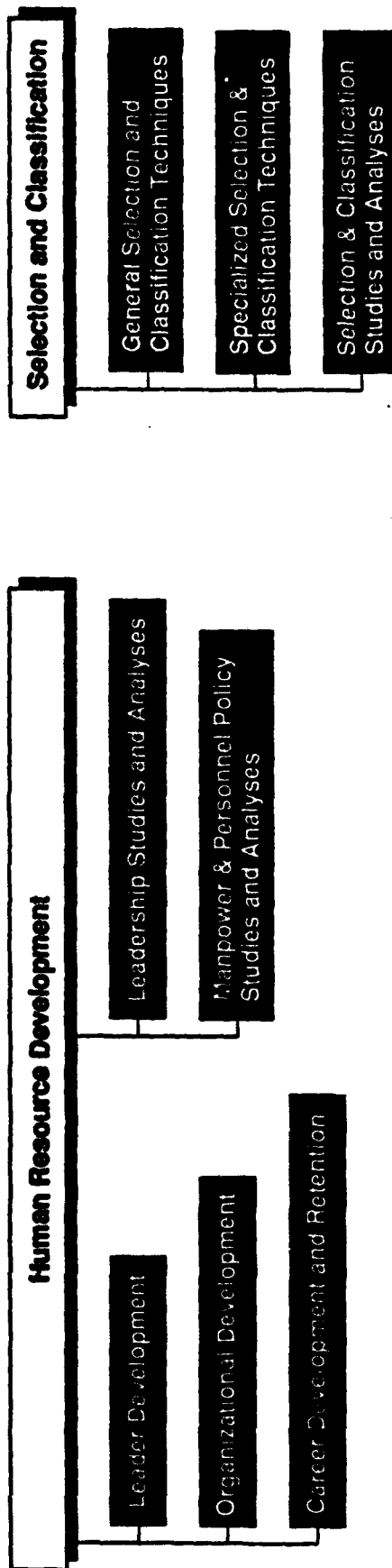
# MANPOWER, PERSONNEL & TRAINING (MPT) S&T PLANNING PROCESS





## FY95 ARI R&D Program Structure

### Manpower and Personnel R&D



### Training Systems R&D

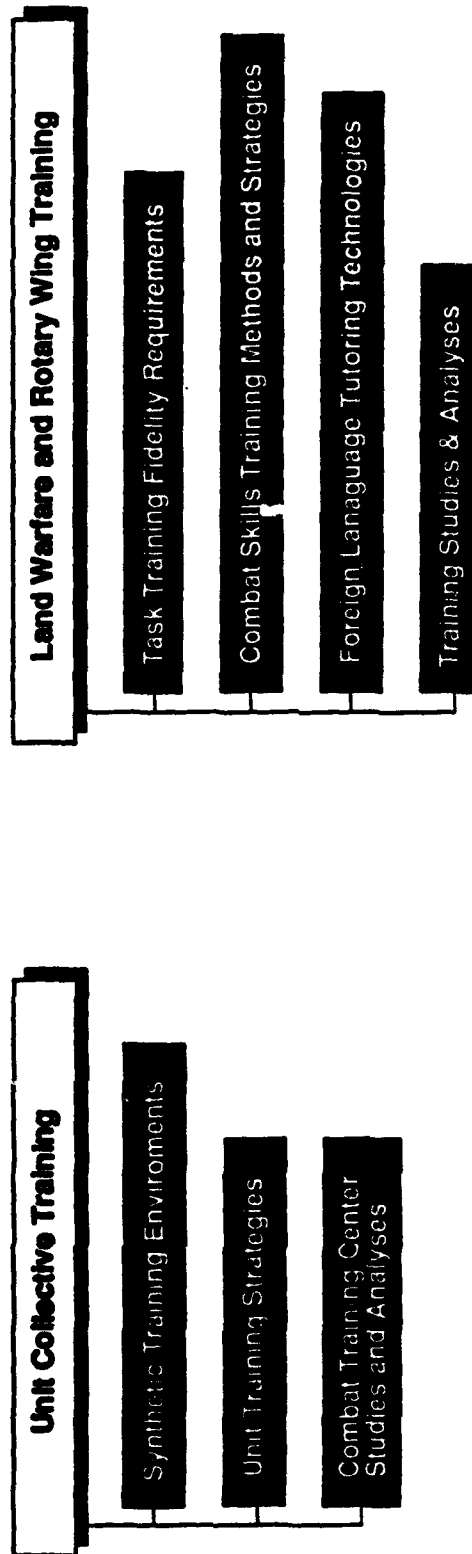


Figure 2

**TRADOC Battlefield Dynamics:** The U.S. Army Training and Doctrine Command (TRADOC) is responsible for developing requirements for today's Army and for future force requirements. It is the commingling of TRADOC's requirements vision with the science and technology forecast of advancements that provides the potential for continued warfighting superiority. TRADOC has developed an underlying concept of future battlefield needs in terms of Battle Dynamics and established Battle Labs<sup>1</sup> as a means to examine promising technologies in support of these dynamics. The battlefield dynamics are: Early Entry, Lethality, and Survivability; Depth and Simultaneous Attack; Battle Command; Battlespace (Mounted and Dismounted); and Combat Service Support. Descriptions of the Battle Labs and TRADOC's R&D requirements is provided in Volume II, Annex C of the Army Science and Technology Master Plan.

The ARI S&T program supports TRADOC's battlefield dynamics in two ways; (1) technology products affecting soldiers and combat units across all Battlefield Dynamics (see Table 1) and, (2) potential technology contributions to specific TRADOC Battle Labs (see Table 2). Training strategies, organizational redesign, leadership development, and personnel issues will be addressed in an iterative cycle of experimentation and assessment with actual troops and commanders and in support of Battle Lab objectives.

ARI has a research unit at the location of three Battle Labs:

Mounted Battlespace Battle Lab: Fort Knox, KY  
Dismounted Battlespace Battle Lab: Fort Benning, GA  
Battle Command Battle Lab: Fort Leavenworth, KA

**Technological Barriers:** As the individual combatant is the most important factor in warfighting, enhancement of individual and collective (unit) performance is a research issue of paramount performance. Among the MPT technology barriers to achieving more effective soldier performance are the need for:

- o More accurate methods for selecting and assigning soldiers to jobs that best fit their abilities.
- o Determinants of individual cognitive performance.
- o Determinants of collective (crew/team/unit) performance.
- o Individual and collective training strategies for synthetic training environments that prepare soldiers to cope with the proliferation of possible missions.

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<sup>1</sup> "Battle Labs provide an environment of real soldiers, in real units, in realistic warfighting scenarios to study warfighting in areas of greatest change on the battlefield. The intent is to ensure that the Army has the best doctrine, training, leader development, organizations, and materiel to fulfill the National Military Strategy—win quickly, decisively, and with minimum losses." (Page II-2, ASTMP Vol I, 2nd Draft, June 1994)

**Table 1**  
**Technology Products Affecting Soldiers Across All Battlefield Dynamics**

<b>Manpower and Personnel</b>	
o	Selection and assignment strategies for downsized Army/diminishing quality pool
o	Long term effects of peace operations on organizations and individual soldiers
o	Leader assessment and development
<b>Training Systems</b>	
o	Combined arms training strategies for unit home station training
o	Cost-effective training strategies for Reserve Component (RC) units
o	Training strategies for night operations
o	Joint Services training strategies using Advanced Distributed Simulation (ADS)

**Table 2**  
**Potential Technology Contributions to Specific TRADOC Battle Labs**

TRADOC Battle Labs					
BATTLE COMMAND	DISMOUNTED BATTLE LAB	MOUNTED BATTLE LAB	EARLY ENTRY	DEPTH AND SIMULT ATK	CBT SER SUPPORT
<ul style="list-style-type: none"> <li>o Cmd-staff orgn redesign</li> <li>o Situational awareness (SA) tng strategies</li> <li>o Battlefield visualization techniques</li> <li>o Leader development models and interventions</li> </ul>	<ul style="list-style-type: none"> <li>o Special Forces (SF) selection</li> <li>o SF recruiting and retention</li> <li>o SA tng strategies</li> <li>o "Own-the-night" tng strategies</li> <li>o Individual combatant simulation</li> <li>o Tng techniques for OOTW</li> </ul>	<ul style="list-style-type: none"> <li>o C/E armor tng strategies</li> <li>o Battlefield synchronization tng strategies</li> <li>o SA tng strategies</li> <li>o Techniques for preparing operators and commanders for future digitized battlefields</li> </ul>	<ul style="list-style-type: none"> <li>o Corps base redesign</li> <li>o Aviation training strategies</li> </ul>	<ul style="list-style-type: none"> <li>o Aviation unit tng strategies</li> <li>o Joint ser tng strategies</li> <li>o SA tng strategies</li> </ul>	



**Technological Opportunities:** Recent advances in the cognitive and computer sciences have potential for lowering the barriers to more effective individual and collective human performance. These include:

- o Computer-based selection techniques for fitting a high quality soldier to the job that best fits his/her individual capabilities, validated against performance on the (simulated) battlefield.
- o Virtual reality (VR) and distributed interactive simulation (DIS)-based training strategies for warfighting training, mission rehearsal and battle planning that permit development of synthetic environments for a new generation of real combat training programs and that takes advantage of new-real time, satellite provided imagery.
- o New training strategies using virtual, constructive and field training environments for cost-effective training for warfighters, their leaders and units -- critical to developing TRADOC's Combined Arms Training Strategy (CATS).
- o VR-based training environments for training and mission rehearsal for ground combatants, such as Special Forces teams with limited time and land resources.
- o Requirements for cost-effective simulators and training devices, possessing the minimum physical fidelity (minimum cost) required to accomplish specific task training objectives.
- o Advances in the cognitive sciences permitting development of "intelligent tutors" for the acquisition of complex cognitive skills, such as foreign languages.

## **OVERVIEW OF ARI'S SCIENCE AND TECHNOLOGY (S&T) PROGRAM**

The following paragraphs provide a brief overview of ARI's Manpower and Personnel S&T and Training S&T programs. Individual tasks, comprising ARI's FY 1995 exploratory development (6.2) and advanced development (6.3) programs, are described in detail in Appendices A and B, respectively. In addition, ARI's S&T program is represented in the Army Science and Technology Master Plan, with 6.2 programs in Chapter IV-O, 6.3 programs in Chapter III-Q and 6.1 (basic research) programs in Chapter V.

### **Manpower and Personnel S&T: Investing in a Smaller, Quality Force**

**Introduction:** The mainstay of the Army is its people. The Army can only maintain readiness with a smaller force, with reduced resources, by ensuring that individuals are assigned to jobs for which they are best qualified, that they are effectively led, and that support systems and career development opportunities are in place to allow them to focus on their professional performance, both in peace and in wartime. The Manpower and Personnel

science and technology program seeks to improve the Army's manpower and personnel systems through research in the broad categories of Human Resource Development and Selection and Classification. Table 3 represents some of the issues currently being addressed by ARI's manpower and personnel research program. On-going research will enhance personnel capabilities by defining future leader requirements and developing new techniques to improve leader skills, technologies for developing effective battle commanders and staff future missions, improving the understanding of the family impacts on soldier performance and retention, and enhancing performance in selected combat arms Military Occupational Specialties (MOS) through refined selection tests.

<b>Table 3</b> <b>Manpower and Personnel Issues</b> <b>Affecting Military Readiness</b> <b>and</b> <b>Example Research Questions</b>	
o Demand for increased productivity	o Can we improve the soldier-job match?
o Demographic changes	o How do social and demographic changes impact accession rate and quality?
o Budget reductions	o How can we reduce personnel costs?
o Changing missions; different threats	o Do new missions require different skills? If so, what are they?
o Affordability	o Can future system be manned with current accessions?
o Higher technological skill requirements	o What new selection/classification measures are required to predict successful job performance?

**Human Resource Development.** A resource constrained Army, charged with accomplishment of increasingly diverse missions across a widening spectrum of operational responsibilities, must be manned by the most qualified, competent and confident leaders at all levels. Human Resource Development (HRD) research is focused on leveraging available and emerging technologies, models and tools to maximize the performance of our personnel resources. Research will focus on identification of individual skills and abilities required for optimal performance by Battle Commanders in diverse operational environments. Complementary efforts will identify optimal operational structures for the most efficient use of group processes and decision making skills in support of this command concept, and generate simulations and interactive tools to assist leaders in self assessment and development of the diverse skills needed in the future. Implications of composite force structures applied in Peace Operations will be analyzed and the application of life course theory will be directed at career, family and retention issues. These efforts will result in strategies, models and tools for use by the Army's leadership in shaping the policies and programs that will define America's Army in the 21st century.

**Selection and Classification.** A declining candidate pool with reducing interest in Army service, combined with an increasing requirement for soldiers with advanced technical abilities, dictates the focus of Selection and Classification (S&C) research efforts. New generation aptitude tests will be developed with applicability to enlistees, Special Operations Forces (SOF) candidates, Reserve Component (RC) volunteers for Peace Operations, specialized Combat Arms soldiers and aviation candidates. Emphasis will be on use of noncognitive predictors of performance potential and psychomotor and spatial tests to optimize job performance through enhanced Person-Job Match (PJM). Outcomes will increase on-the-job efficiency and job satisfaction, which will result in reduced attrition both in the training base and at career decision points. Additional efforts will address the declining propensity of the candidate pool for Army service. The focus will be on identifying the linkages between propensity and actual enlistment behaviors and identifying separate indicators that may be more predictive of actual enlistment behavior than propensity.

### **Training Systems S&T: Training for Future Combat**

#### **Introduction:**

"Training is not a cost, but an investment in readiness and our National Security."  
(AMP, Annex P-Training, January 1995)

The Combined Arms Training Strategy (CATS) is the Army's architecture for training and educating its soldiers, leaders and units. The objective of the CATS architecture is to provide doctrine-based strategies for training unit warfighting missions and tasks and individual soldier and leader skills in institutions, in units, and through self-development.

The Army Modernization Plan states that training simulations are critical for the future.

"The training vision for the Year 2000 and beyond is to produce a seamless simulation environment which allows actual combat systems, manned simulators and other simulations to exercise on a virtual battlefield."

Distributed interactive simulation (DIS) and virtual reality (VR) technology will permit the development of synthetic battlefields for training that complements field training exercises at home station and at the Combat Training Centers (CTC). Synthetic training environments built on DIS and VR technologies will enhance training opportunities. However, advances in the behavioral sciences are required to provide the training strategies that will lead to the most *efficient* and cost-effective utilization of these training resources. "The effective application of technological advances in the design of realistic and effective combined arms training systems gives every indication of being even more difficult to achieve than were the technology advances" (HASC Report 101-665, August 1990).

**Unit Collective Training.** This program is directed at the unique contributions that behavioral science can make to the effective exploitation of synthetic environments for training. Although most attention on synthetic environments and distributed interactive simulations (DIS) technology development has been focused on computer hardware and

software, the training-effectiveness of DIS-based training innovations rests in large measure on the training strategies, performance measurement techniques, and performance feedback methods that are the products of this "behavioral technology" research program. The research products of this program support related efforts of the Simulation, Training and Instrumentation Command (STRICOM) and the Training and Doctrine Command (TRADOC). This includes development of virtual reality-based training strategies and demonstration training programs for individual combatants that will maximize the value of systems procured by STRICOM. It also includes component training strategies for the development and validation of TRADOC's comprehensive Combined Arms Training Strategy (CATS).

**Land Warfare Training.** Research is directed at guidelines for cost-effective strategies (i.e., cost-effective mix of field training with training aids, devices, simulators and simulations (TADSS)) for individual and small group (team/crew) training for mounted and dismounted operations. Simulation-based training and performance assessment technologies will address issues associated with the digitized battlefield of the future. Recent advances in cognitive science leveraged with emerging computing technologies will be used to demonstrate an intelligent tutor for the acquisition and retention of foreign language skills needed for worldwide contingency missions. Training concepts and technologies will be developed to address the unique problems encountered in night operations, with focus on the Light Infantry.

**Rotary Wing Training.** Research will be conducted to develop an optimum combined arms aviation training strategy. It will address individual aviator skills, aircrew skills, safety procedures and unit combat tasks. Research results will define the minimum fidelity requirements for critical aircrew skills training. Requirements will be established for the utilization of and upgrades to existing simulators. The results will be empirically-based training applications for aircrews, teams, and units to provide an optimally cost-effective mix of simulated and actual flight training.

## Major FY 1994 Accomplishments

Table 4 shows major FY 1994 Manpower and Personnel S&T and Training Systems S&T program accomplishments.

<b>Table 4</b> <b>Major FY 1994 Accomplishments</b>	
<b>MANPOWER AND PERSONNEL SCIENCE AND TECHNOLOGY</b>	
<b>Exploratory Development (6.2)</b>	<b>Advanced Development (6.3A)</b>
<p>Developed techniques to identify the decision-making requirements of C2 tasks and identified critical competencies for battalion level battle commanders</p> <p>Developed and evaluated experimental soldier classification procedures including temperament measures</p> <p>Developed methods for identifying optimal job assignments for lower aptitude personnel</p> <p>Completed experimental investigation of issues related to ensuring survey data quality</p> <p>Identified predictors of cadet leader development</p>	<p>Constructed guidelines for organizational design with respect to leader span-of-control</p> <p>Identified relationship between peacetime performance and rated combat performance</p> <p>Completed development of MOS restructuring tools and decision support technology</p> <p>Developed and evaluated a prototype career decision aid for SF recruits and families</p> <p>Assessed impact of family support measures during Operation Restore Hope</p> <p>Provided evaluation methodology and baseline data for assessing impact of the evolving Army Tactical Command and Control System (ATCCS) on battle command performance</p>

<b>TRAINING SYSTEMS SCIENCE AND TECHNOLOGY</b>	
<b>Exploratory Development (6.2)</b>	<b>Advanced Development (6.3A)</b>
<p>Determined capability to perform land navigation and target detection in virtual reality environment</p> <p>Tested prototype unit skill acquisition and retention model using armor platoon tasks in a simulated training environment</p> <p>Determined team coordination training requirements for medical emergency teams</p> <p>Determined visual scene requirements for helicopter gunnery training</p> <p>Determined texture requirements for nap-of-the-earth helicopter flight training in simulators</p> <p>Developed and evaluated unaided night vision training techniques</p>	<p>Determined training objectives that are appropriate for DIS as part of CATS</p> <p>Demonstrated asynchronous computer conferencing technology for cost-effective battalion staff training</p> <p>Developed a device-based tank gunnery training strategy for Reserve Components</p> <p>Conducted detailed training requirements analysis of the most critical combat functions (CCF)</p> <p>Evaluated the training effectiveness of low-cost, part-task, aviation training devices</p> <p>Transferred the Navy's "What Works" guidelines to TRADOC for classroom training in Army schools as part of Tri-Service Reliance Agreement</p>

## Major FY 1995 Planned Accomplishments

Table 5 shows major planned accomplishments for FY 1995. Appendices A and B contain detailed information for planned FY 1995 accomplishments within each task description.

<b>Table 5</b> <b>Major FY 1995 Planned Accomplishments</b> <b>MANPOWER AND PERSONNEL SCIENCE AND TECHNOLOGY</b>	
<b>Exploratory Development (6.2)</b>	<b>Advanced Development (6.3A)</b>
<p>Determine relationship among leaders' problem-solving capabilities, leadership style, and rated effectiveness</p> <p>Develop new measures of performance-related aptitude, leadership, and stress tolerance</p> <p>Develop new selection techniques for enlistees with low aptitude scores</p> <p>Analyze long-term effects of Sinai peacekeeping on soldier career development</p> <p>Conduct test of new paradigm of distributed battle command planning and decision making</p> <p>Develop computer modeling tools to assist in the design of staff groups</p>	<p>Integrate the Battle Command Training Program data base into the Louisiana Maneuvers Task Force data base for analyses on battle command decision-making</p> <p>Develop user manuals for Decision Support System for MOS restructuring</p> <p>Demonstrate career decision aid for Special Forces recruits and families</p> <p>Recommend modifications to the selection, classification, reenlistment and promotion systems based on Career Force findings</p> <p>Develop tools and techniques to examine issues related to National Guard deployment in the Multinational Force and Observers (MFO) peacekeeping mission</p>

<b>TRAINING SYSTEMS SCIENCE AND TECHNOLOGY</b>	
<b>Exploratory Development (6.2)</b>	<b>Advanced Development (6.3A)</b>
<p>Assess team training capability in virtual reality environments</p> <p>Design collective training design methodology for distributed interactive simulation (DIS) environment</p> <p>Validate model of skill acquisition and decay for platoon level tasks</p> <p>Develop model for predicting amount of training needed to reacquire skills after extended breaks in service</p> <p>Demonstrate portable, computer-based language tutor</p> <p>Determine empirically-based flight simulator scene content requirements for critical aviation tasks</p> <p>Develop multi-service training methodology for DIS environment</p>	<p>Develop training strategy and prototype training program for Close Combat Tactical Trainer (CCTT)</p> <p>Design methodology for combined arms training programs for CATS</p> <p>Develop aviation training strategy prototype emphasizing low-cost, part-task simulators and training devices</p> <p>Conduct front-end analysis for determining peacekeeping and Operations Other Than War (OOTW) training requirements</p> <p>Conduct limited tryouts of prototype CATS</p> <p>Develop prototype automated training analysis and feedback system for generating after action reviews (AARs) for DIS-based training</p>

## OBJECTIVES AND PLANS

ARI's investment strategy covers the Army's MPT S&T program for the years FY 1995 to FY 2000, however, the focus of this document is on FY95. The program described in Appendices A and B is in accordance with that described in the Army Science and Technology Master Plan (ASTMP), FY95.

### Science and Technology Objectives

ARI's highest priority S&T tasks are covered in six Science and Technology Objectives (STO). ARI's six STOs are listed below and described in detail in Appendix C.

<u>STO#</u>	<u>Title</u>
III.Q.1	Soldier Assignment
III.Q.2	Unit Training Strategies
IV.J.5	Combined Arms Training Strategy for Aviation
IV.J.6	Foreign Language Skill Training
IV.J.8	Cognitive and Collective Skill Retention
IV.J.9	Human Dimensions of Battle Command

### ARI Technology Demonstrations

Technology demonstrations (tech demos) are intended to demonstrate the potential of S&T products in typical Army settings. ARI's eight tech demos, arranged in chronological order, are shown in Table 6. The eight are described briefly in terms of three major MPT thrusts in the paragraphs following the table: Manpower and Personnel, Leader Development, and Training Effectiveness.

**Table 6**  
**ARI Technology Demonstrations**

<b>Tech Demo Title</b>	<b>Objective</b>	<b>Date</b>
<b>Portable Computer-Based Foreign Language Tutor (IV.J.6)</b>	To demonstrate a computer-based tutor that can train and sustain job-critical foreign language skills in a realistic immersive environment	FY 1995
<b>Simulator Training Research Testbed for Aviation (IV.J.5)</b>	To demonstrate an effective methodology for determining the minimum fidelity levels required to support aircrew training	FY 1996
<b>The Special Forces Warrior (III.Q.1)</b>	To demonstrate technologies to enhance SOF recruiting from within the Army and improve retention	FY 1996
<b>Selecting the Warrior (III.Q.1)</b>	To demonstrate in a simulated combat environment the utility of new S&C tests for predicting combat performance	FY 1996
<b>Selection and Classification for High Performing Soldiers (III.Q.1)</b>	To demonstrate in an operational context the utility of new initial entry enlisted selection and classification (S&C) procedures for better soldier-job matching	FY 1997
<b>Training Strategies for Distributed Interactive Simulation (DIS) (III.Q.2)</b>	To demonstrate empirically-based collective training strategies within CCTT/DIS that result in realistic and effective training	FY 1997
<b>Human Dimensions of Battle Command (IV.J.9)</b>	To demonstrate in a realistic exercise environment an increment in command and staff performance on critical battle command tasks  To compare and evaluate alternative command post organizations	FY 1998
<b>Combined Arms Training Strategy (III.Q.2)</b>	To demonstrate a user validated, cost-effective CATS for an entire range of missions	FY 1998



**Manpower and Personnel Tech Demos:** Personnel quality can have a major impact on training. Brighter soldiers learn more quickly and retain information longer. When a soldier is assigned to the job that best fits his or her abilities, performance is optimized. The following tech demos are directed toward demonstrating the importance of proper selection and assignment to effective soldier performance.

**The Special Forces Warrior (FY96):** This effort will demonstrate technologies for Special Forces warriors that enhance recruiting and selection (from within the Army), and, hence, lead to increased warfighting performance and later to retention of the most qualified personnel.

**Selecting the Warrior (FY96):** This effort will demonstrate in a simulated combat environment the utility of new tests to select warriors based on their capability to perform in combat.

**Selection and Classification of High Performing Soldiers (FY97):** The utility of new procedures that will improve soldier performance through selection of high quality soldiers and their assignment to jobs that best fit their capabilities during a time of rapidly-changing job requirements will be demonstrated in an operational context.

**Leader Development Tech Demo:** The following tech demo provides effective training strategies to equip battle commanders with the requisite knowledge and skills for success.

**Battle Command (FY98):** The objective is to demonstrate, in a realistic exercise environment such as Prairie Warrior or a BCTP Warfighter Exercise, an increment in command and staff performance on critical battle command tasks including situation assessment, visualization, and communication of intent. In addition, this effort will compare and evaluate alternative command post organizations.

**Training Effectiveness Tech Demos:** The efforts described below will provide empirical demonstration of important, cost-effective training strategies and technologies for simulator-based training.

**Simulator Training Research Advanced Testbed for Aviation (STRATA) Demonstration (FY96):** This tech demo will demonstrate the methodology for determining minimum fidelity levels needed to support aircrew training for initial skill acquisition and for sustaining tactical and flight skills.

**Portable Computer-Based Foreign Language Tutor (FY95):** This tech demo will demonstrate a PC-based tutor that trains and sustains job-critical foreign language skills in a realistic immersive environment.

**Training Strategies for Distributed Interactive Simulations (DIS) (FY97):** This tech demo will demonstrate empirically-based collective training strategies within CCTT/DIS that result in realistic and effective training.

**Combined Arms Training Strategy (CATS) (FY98):** This tech demo will demonstrate user-validated home-station training management strategies utilizing an effective and affordable mix of live exercises and synthetic environments for an entire range of missions.

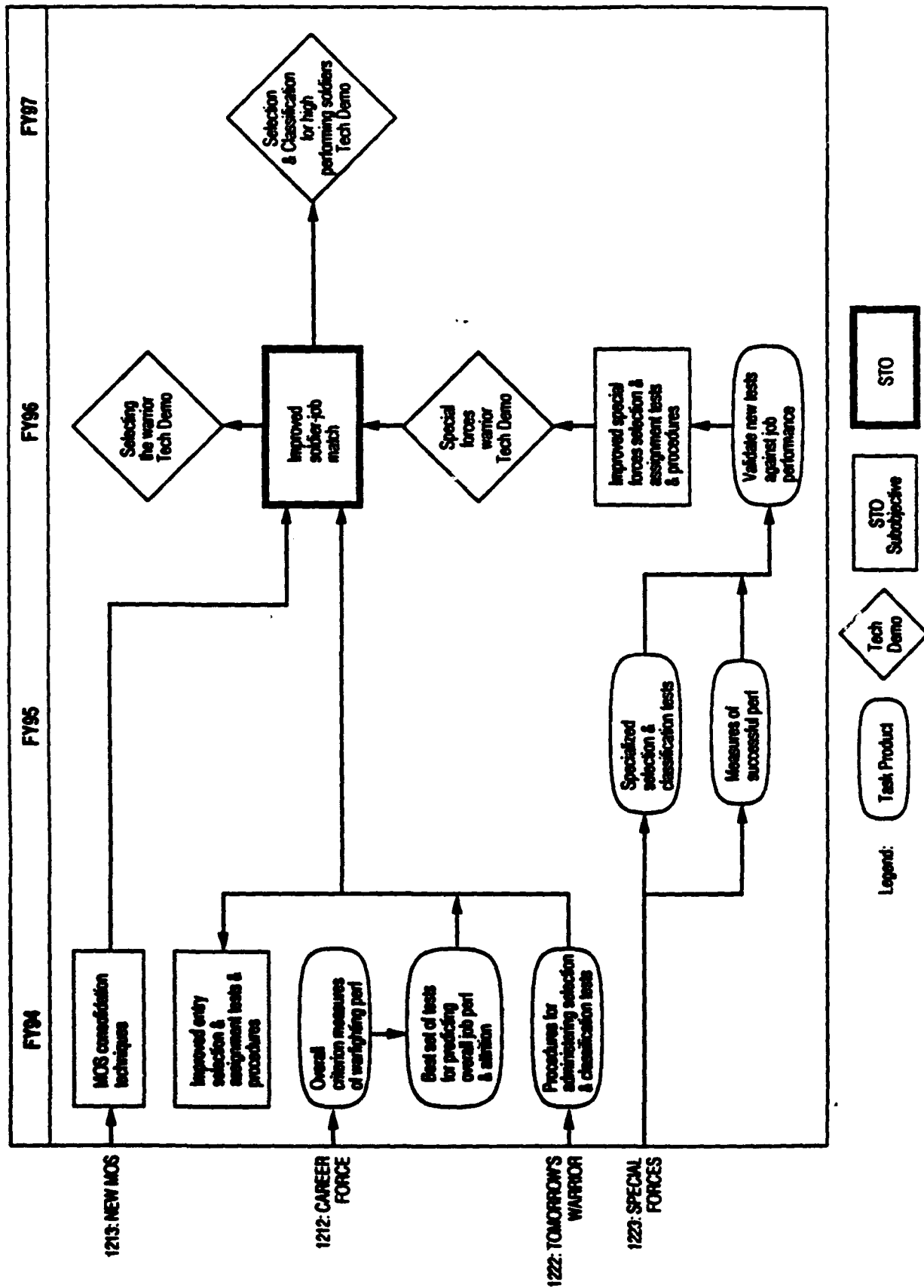
### **ARI MPT S&T Roadmaps**

The roadmaps in Figures 3 through 8 are graphical depictions of important milestones for achieving the goals specified for each of ARI's six STOs.

### **Manpower, Personnel and Training (MPT) S&T Program Time Lines**

An overview of ARI MPT program time lines through the FY 2000 POM are presented in Appendix D.

# ROADMAP FOR STO III.Q.1 SOLDIER ASSIGNMENT



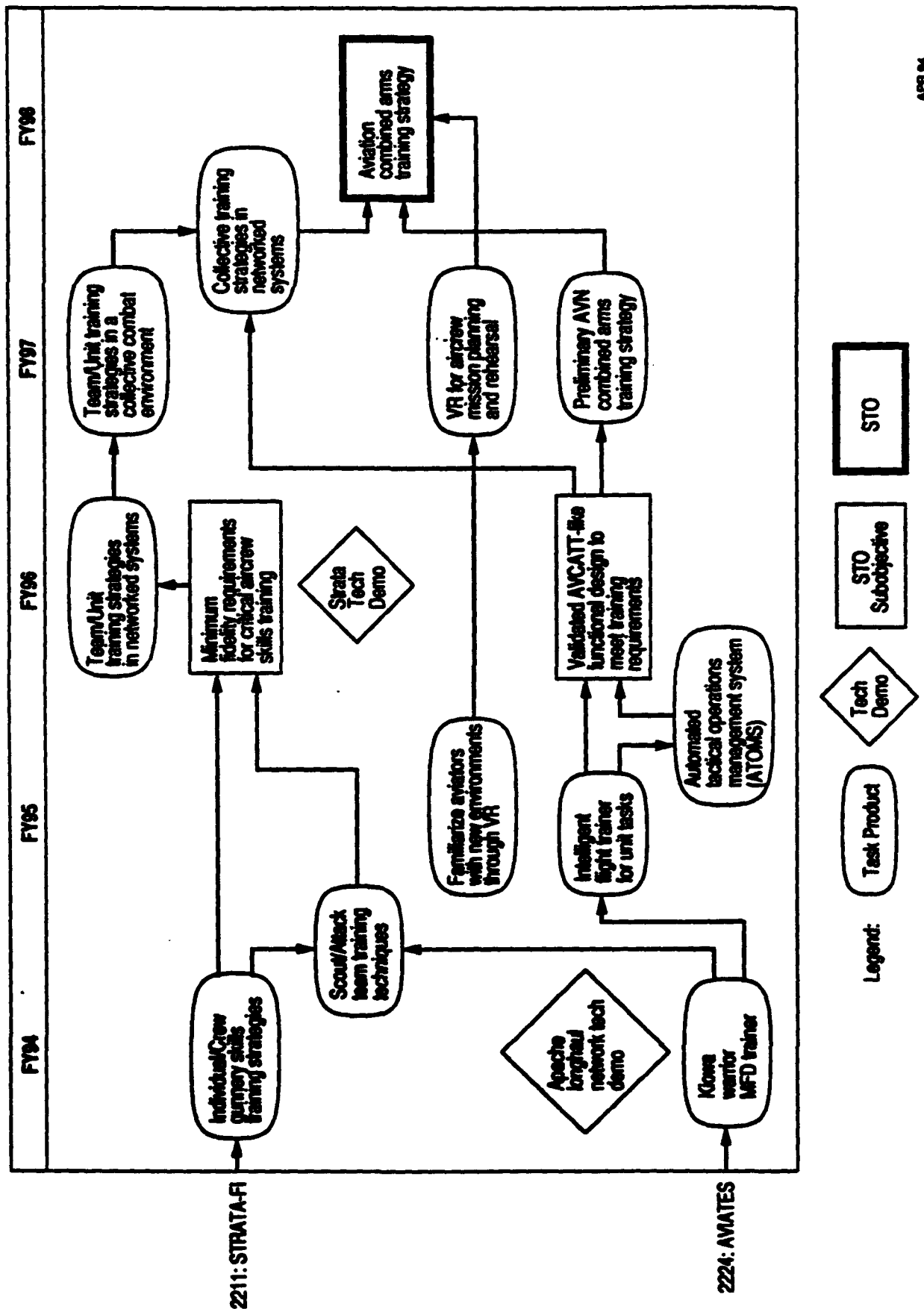
APR 94

	FY94	FY95	FY96	FY97	FY98
2113: DESYNE					
2114: SYNTRAIN					
2223: NIGHTFIGHTER					
2122: MOSES					
2124: STRONGARM					
2125: TRAINUP					
2127: LIC-T					
2128: COMBAT					

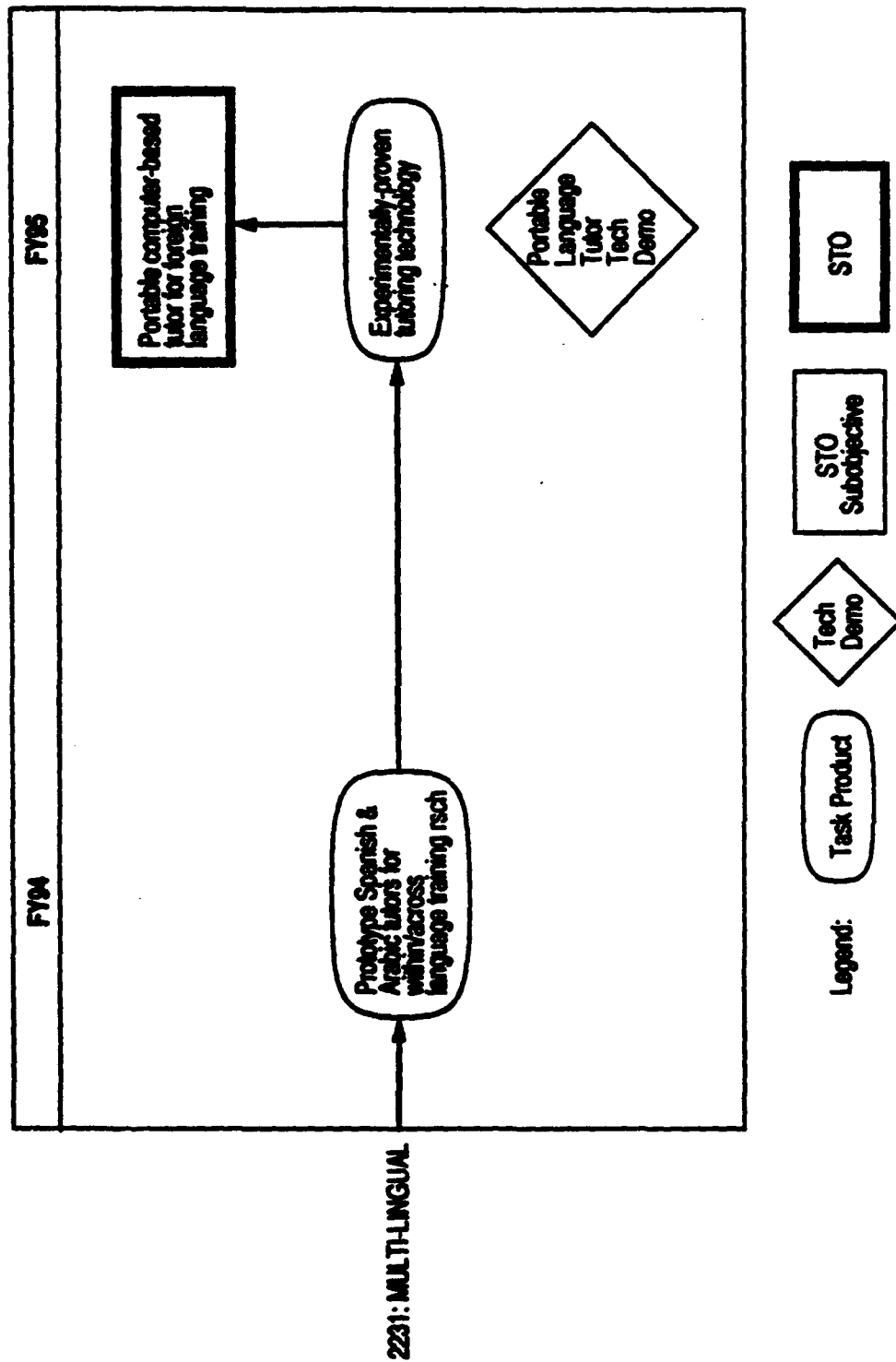
Legend:

- Test Product
- Tech Demo
- STO Subjective
- STO

# ROADMAP FOR STO IV.J.5 COMBINED ARMS TRAINING STRATEGY FOR AVIATION

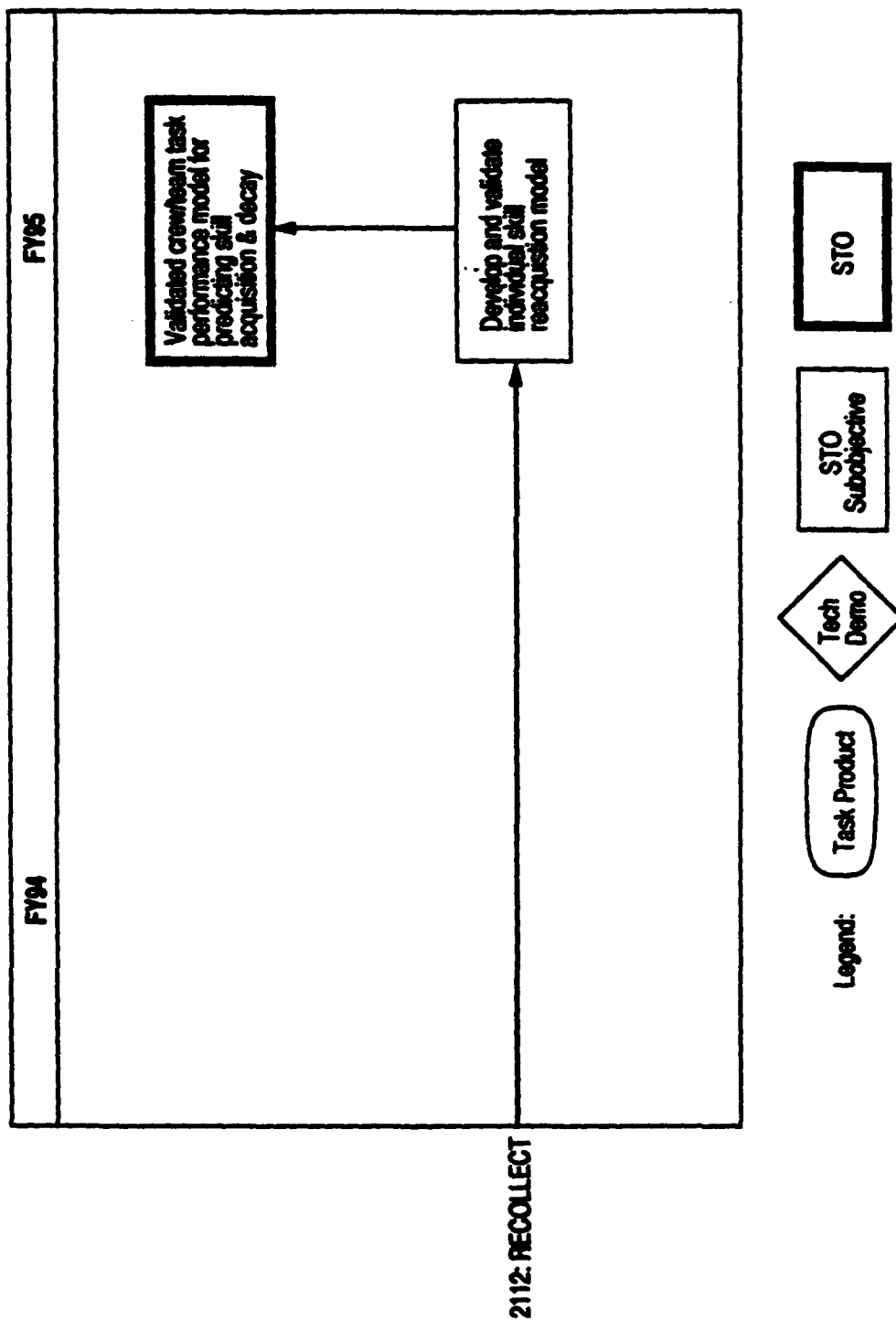


# ROADMAP FOR STO IV.J.6 FOREIGN LANGUAGE SKILL TRAINING



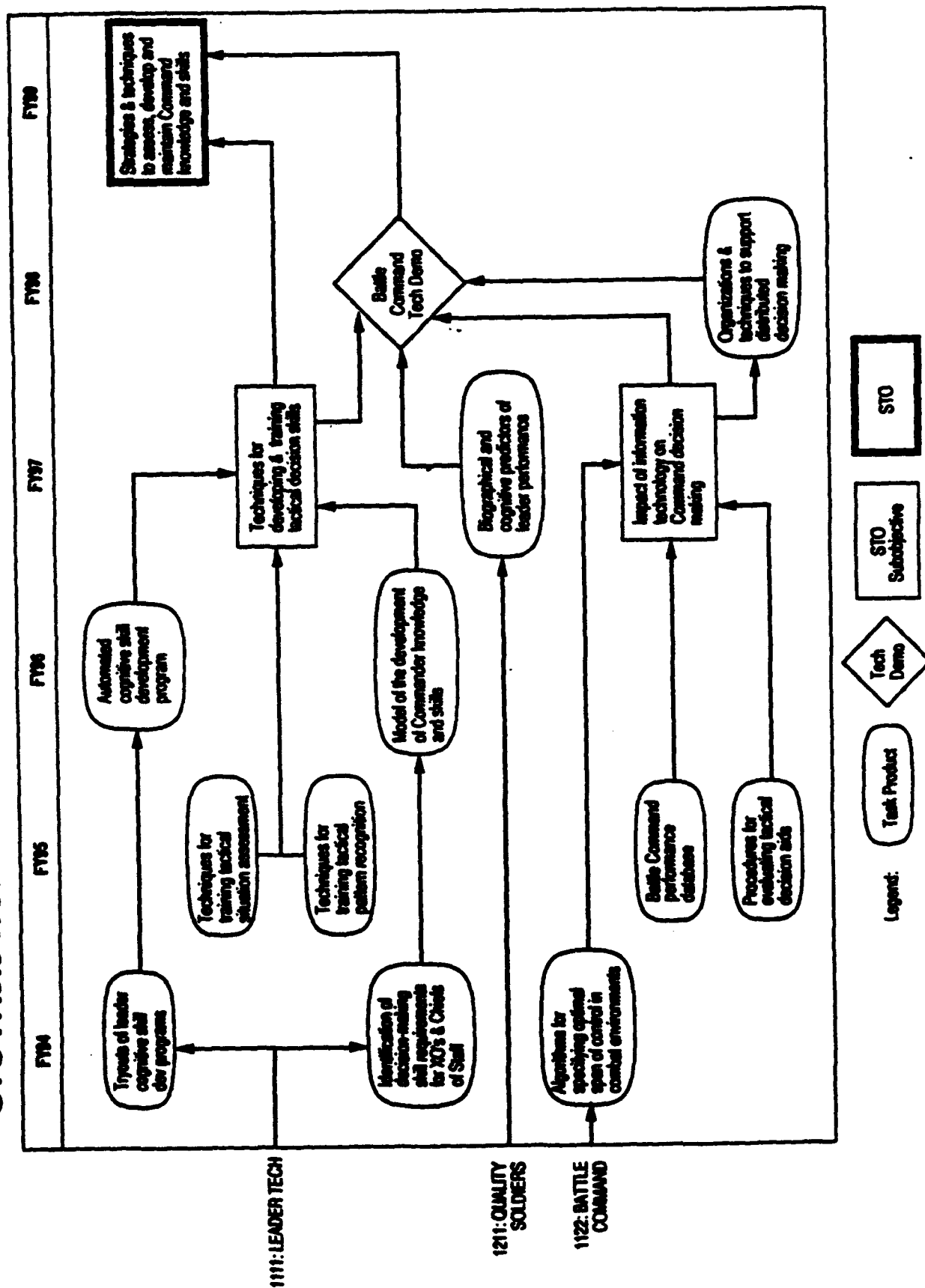
APR 84

# ROADMAP FOR STO IV.J.8 COGNITIVE & COLLECTIVE SKILL RETENTION



APR 94

# ROADMAP FOR STO IV.J.9 HUMAN DIMENSIONS OF BATTLE COMMAND



APR 94

Figure 8



## **APPENDIX A**

### **Technology Development: Exploratory Development (6.2)**

**Manpower and Personnel Tasks  
(1.1 - 1.3)**

**Exploratory Development**

**TASK TITLE: LEADER TECH: Leader Skill Assessment and Development Technologies (1111)**

**OBJECTIVE:** Develop and evaluate emerging technologies for leader development and assessment which could improve the capabilities of future Army leaders.

**APPROACH:** This research will explore new technologies to assess the relative contribution of the various characteristics that define the highly effective Army leader as the leader develops through his or her career. A number of different approaches will be explored, to include biographical data, cognitive assessments, and job samples. New instruments will be developed and tried out on cross-sectional samples of officers at different stages in their careers. These data will be correlated with measures of leader performance and other aspects of job performance. Models of leader development at successive, critical stages in an Army career will be developed. New technologies to facilitate the growth of leader skills, to include cognitive skills and leadership knowledge, will be developed and evaluated.

**PROGRESS:**

Cognitive analysis techniques to identify and verify decision making requirements of command and control tasks

Validated list of characteristics which distinguish tactical expertise

Strategic Leader Development Inventory (SLDI) software package completed for ICAF and USAWC use

Creative problem solving elective at ICAF

Complete proof of concept -- automated cognitive and metacognitive skill assessment and development

Completed data analysis and reporting -- Cognitive Skill Assessment Battery

**FY95 MILESTONES:**

Techniques for training "expert" patterning and thinking skills necessary for tactical decision making

Automated conceptual and cognitive skill assessment techniques

A framework of the mental skills used in maneuver planning

Concepts for improved situation assessment training, procedures, and decision aids

**PROJECTED TECHNOLOGY:**

**FY96**

Simulation technology for development and assessment of leader conceptual and cognitive skills

Validated leader assessment instruments

**FY98**

Simulation-based training strategies to exercise battle command skills

Model of the leader development process across organizational levels

War fighting leaders tech demo of battle command skills

\*\*\*\*\*

**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**IV.J.9 Human Dimensions of Battle Command**

**TECHNOLOGY DEMONSTRATION:**

Developing Warfighting Leaders - FY98

**DEFENSE TECHNOLOGY AREA: Manpower and Personnel**

\*\*\*\*\*

**START DATE: FY93**

**END DATE: FY98**

**FY95 FUNDING (\$000): \$408 PROGRAM ELEMENT/PROJECT: 62785 A790**

**DIVISION: Manpower and Personnel Research Division**

**RESEARCH UNIT:**

**Fort Leavenworth**

**POC: Dr. Stanley Halpin, (913) 684-4933; DSN 552-4933**

**TASK TITLE: LEADER SPECS: Leader Development Requirements and Organizational Performance (1115)**

**OBJECTIVE:** To develop data base capabilities for understanding, evaluating, and determining the leader behaviors required for leadership effectiveness over the career.

**APPROACH:** This research will build on emerging technologies for assessing leader characteristics, including: biographical data, cognitive assessment, and assessment of tacit leadership knowledge. Those technologies will be used to assemble a data base on the pre-commissioning leadership behavior of officer candidates. This data base will serve as a baseline for continued, longitudinal tracking of entering officers over their careers to identify effective leadership behaviors by level of leadership and the developmental experiences which contribute to progressive leader development. Concurrently, data will be collected in realistic collective training exercises and in laboratory experiments on factors affecting the performance of command groups (brigade through corps) and the senior leaders forming such groups. These data will provide (1) insights on developmental experiences to be measured at later career stages; and (2) interventions for improving commander and command group performance through developmental practices or through changes in group structure, stability, operating procedures, or supporting tools. To enable continued development of the baseline data base over the career and to support acquisition and assessment of policy relevant information, technologies will be developed for linking existing research and operational data bases, to include specifications for the standardization of data bases for rapid data retrieval and data base linkage.

**PROGRESS:** New Start

**FY95 MILESTONES:**

Determination of relationships between leaders' problem-solving capabilities, leadership styles, and rated effectiveness

Validation of leader problem-solving skills and assessment techniques

Taxonomy of errors in group problem solving

Methodology for identifying impact of "load sharing" on command-group effectiveness

**PROJECTED TECHNOLOGY:**

**FY96**

Identification of impact of homogeneity vs. heterogeneity of prior experience and cognitive style within principal staff

**FY97**

Validated measures of leadership tacit knowledge

**FY98**

**Manual for development of leadership tacit knowledge**

**FY99**

**Assembly of Baseline Officer Longitudinal Data Set (BOLDS)**

**FY00**

**Manual for analysis of BOLDS**

**Recommendations for practices of early leader development**

**\*\*\*\*\***

**SCIENCE AND TECHNOLOGY OBJECTIVE (STO): N/A**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Manpower and Personnel**

**\*\*\*\*\***

**START DATE: FY95**

**END DATE: FY00**

**FY95 FUNDING (\$000): \$862 PROGRAM ELEMENT/PROJECT: 62785 A790**

**DIVISION: Manpower and Personnel Research Division**

**RESEARCH UNIT:**

**Leader Development  
Organization and Personnel Resources  
Fort Leavenworth**

**POC: Dr. Trueman Tremble, (914) 938-2945; DSN 688-2945**

**TITLE: QUALITY SOLDIERS: Alternative Selection and Evaluation  
Techniques (1211)**

**OBJECTIVE:** To increase the Army's selection and classification capability through (a) new methods for measuring performance-related aptitudes; (b) improved prediction of leadership and performance under stress; and (c) increasing the validity of temperament and psychomotor/spatial tests.

**APPROACH:** New measures of performance-related aptitude, leadership, and stress tolerance will be developed and evaluated. Measurement error will be addressed by research on developing improved directions to test takers and control of test-related faking and coaching.

**PROGRESS:**

Preliminary evaluation of usefulness of biographical data for predicting attrition of officers

Preliminary evaluation of coaching effects on temperament and spatial measures

Development of strategies to counter the effects of coaching and faking on temperament measures

Demonstration of incremental validity of biographical data measure for predicting performance of West Point cadets

Development of forced-choice measure of temperament

**FY95 MILESTONES:**

Evaluation of trial classification system based on temperament measures

Evaluation of strategies to counter the effects of coaching

Improved aptitude measurement

- Research measures of new predictors
- Conceptually relevant measures of performance

**PROJECTED TECHNOLOGY:**

**FY96**

Improved test composites for classification of enlisted personnel

Faking-resistant temperament measure

**FY97**

**New measures of aptitude related to enlisted leader performance requirements**

**\*\*\*\*\***

**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**IV.J.9 Human Dimensions of Battle Command**

**TECHNOLOGY DEMONSTRATION:**

**Battle Command - FY98**

**DEFENSE TECHNOLOGY AREA: Manpower and Personnel**

**\*\*\*\*\***

**START DATE: FY90**

**END DATE: FY97**

**FY95 FUNDING (\$000): \$1087      PROGRAM ELEMENT/PROJECT: 62785 A790**

**DIVISION: Manpower and Personnel Research Division**

**RESEARCH UNIT:**

**Selection and Assignment**

**POC: Dr. Michael Rumsey, (703) 274-8275; DSN 284-8275**



**TASK TITLE: JOB MATCH: Determining Minimal Entry Qualifications  
(1221)**

**OBJECTIVE:** To improve selection and classification for enlisted soldiers scoring below the mean on the current measure used for initial selection, the Armed Forces Qualification Test (AFQT).

**APPROACH:** Identify measurable individual characteristics, such as spatial aptitude, that can help predict performance of soldiers with average to below average cognitive aptitude. At the same time, identify Army Military Occupational Specialties (MOS) that can be performed effectively by soldiers with average to below average cognitive aptitude. Then, determine the best composite for predicting performance of the soldiers, and determine how to set minimum entry standards on these composites for individual MOS.

**PROGRESS:**

Empirical identification of predictors of performance of lower aptitude personnel

Development of new predictor composites for lower aptitude personnel

Identification of best job assignments for lower aptitude personnel

**FY95 MILESTONES:**

Preliminary algorithm for generalizing results to non-tested MOS

Effects on total MOS performance of using new composites

New selection techniques for soldiers with low AFQT scores

**PROJECTED TECHNOLOGY:** N/A (task ends in FY95)

\*\*\*\*\*

**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):** N/A

**TECHNOLOGY DEMONSTRATION:** N/A

**DEFENSE TECHNOLOGY AREA:** Manpower and Personnel

\*\*\*\*\*

**START DATE:** FY91      **END DATE:** FY95

**FY95 FUNDING (\$000):** \$244    **PROGRAM ELEMENT/PROJECT:** 62785 A790

**DIVISION:** Manpower and Personnel Research Division

**RESEARCH UNIT:**

**Selection and Assignment**

**POC: Dr. Michael Rumsey, (703) 274-8275; DSN 284-8275**

**TASK TITLE: LIFELINE: The Life Course Approach to Human Resources  
Development Processes (1311)**

**OBJECTIVE:** To test the applicability of the emerging technology of life course theory to the investigation of major Army human resource development issues such as the long-term effects of combat, organizational and mission changes (e.g., downsizing, peace operations, and racial integration) on career commitment and development in Army leaders.

**APPROACH:** The approach is two-fold: First, apply life course technology and related methodologies to investigate the current effect of Army organizational changes/events. Second, develop models of the long-term effects of organizational changes and events. The Army organizational changes/events to be investigated include participation in: (1) Operation Desert Shield/Desert Storm, (2) the recent downsizing and home-basing of the Army, (3) peace operations, (4) service in the reserve and (5) race and gender integration. The Army payoffs will come from our improved, immediate understanding of the events themselves while we also look to their long-term impacts on retention, readiness, and spouse support.

**PROGRESS:**

Field tests of Life Course methodology at Fort Drum (effects of peace operations on career intent)

Peace Operations Conference to define research issues

Downsizing case study at Fort Monmouth to determine what key leadership and organizational strategies and tactics influence downsizing outcomes for survivors

Pilot analysis of the benefits of Reserve Component service

Macro assessment of the effects of military service on attitudes toward African-Americans

Plan for peace operations research

**FY95 MILESTONES:**

Identification of Peace Operations Force Issues via:

- Survey of former commanders
- Interviews with UN forces
- Field work in the Sinai

**PROJECTED TECHNOLOGY:**

**FY96**

Cross sectional study of lessons learned in peace operations using life course methodologies

**FY97**

Structural models of impact of peace operations on soldier career development and commitment

**FY98**

Longitudinal follow-up with personnel involved in peace operations using life course survey techniques

**FY99**

Study of the organizational impacts of peace operations

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO): N/A**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: N/A**

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**START DATE: FY93                      END DATE: FY01**

**FY95 FUNDING (\$000): \$454   PROGRAM ELEMENT/PROJECT: 62785 A790**

**DIVISION: Manpower and Personnel Research Division**

**RESEARCH UNIT:**

**Organization and Personnel Resources**

**POC: Dr. Paul Gade, (703) 274-8866; DSN 284-8867**

**Training Systems Tasks**  
**(2.1 - 2.2)**

**Exploratory Development**

**TASK TITLE: VIRTUE: Virtual Environments for Combat Training and Mission Rehearsal (2111)**

**OBJECTIVE:** To demonstrate, under controlled laboratory conditions, principles of behavioral science that exploit the emerging technology known as virtual reality (VR) for training and mission rehearsal.

**APPROACH:** Develop laboratory facility and conduct experiments to determine the most cost-effective methods for immersing soldiers in visual and auditory environments. Touch, force feedback, realistic weapon simulations, and whole-body movement will be included as components of virtual environments, as the technology matures. The work will be conducted in cooperation with the Naval Air Warfare Center (NAWC) Virtual Environments Training Technology Program. Experiments on training, mission planning, and mission rehearsal methods for commanders, dismounted soldiers, and the Special Operations Forces (SOF), will be conducted in conjunction with either a Distributed Interactive Simulation (DIS) training site or a SOF training site.

**PROGRESS:**

Defined parameters for near-, mid-, and far-term virtual environment interface capabilities

Established VR environmental research facility

Completed review of infantry and special operations performance requirements and VR technological capabilities

Developed test scenarios and task battery for assessing performance in VR

Completed assessment of task performance and side effects varying visual resolution

Demonstrated capability to train individual team members using VR

Determined contribution of stereopsis in VR displays to performance

Assessed effectiveness of VR for spatial knowledge acquisition

Assessed capability to perform land navigation and target detection in virtual environments

**FY95 MILESTONES:**

Assess capability to train individuals to perform multiple military tasks and maintain situational awareness in a virtual environment

Assess capability to conduct team training in virtual environments

Develop prototype voice and gesture interface for control of simulated squad members in VR environments

**PROJECTED TECHNOLOGY:**

**FY95**

Specification of fidelity requirements for individualized team training, and demonstration of limited team training in VR environment

**FY97**

Optimal methods for training individual team members using VR

**FY98**

Commander, special forces and infantry team training and performance assessment methods for use with VR

\*\*\*\*\*

**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**IV.J.5 Combined Arms Training Strategy for Aviation**

**TECHNOLOGY DEMONSTRATION:**

**Individual Combatant Training in Virtual Environments - FY98**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY92**

**END DATE: FY98**

**FY95 FUNDING (\$000): \$655      PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Simulator Systems**

**POC: Dr. Stephen Goldberg, (407) 380-4690; DSN 960-4690**

**TASK TITLE: RECOLLECT: Acquisition and Retention of Collective Skills in Synthetic Training Environments (2112)**

**OBJECTIVE:** To model the development (from initial skill acquisition to skill mastery), performance proficiency, retention, and reacquisition to skill proficiency of individual and small-unit collective skills. The collective skill research will focus on development and retention of skills in synthetic training environments; the individual skill research will emphasize the reacquisition of skills in mobilization training environments. Such models will have great utility for designing more effective training programs to cope with compressed training schedules during mobilization of reservists.

**APPROACH:** Previous research in skill acquisition and retention has focused on individual skills. The current research program addresses gaps in the technology base: collective skill acquisition and retention, and individual skill reacquisition. Increased reliance on simulation for crew training and the planned networking of simulators for unit-level training requires the modeling of major variables underlying collective skill acquisition. Collective tasks performed by crews and platoons will be categorized into sets of previously learned skills, such as perceptual-motor, procedural, and problem solving. M1A1 tank crews will be the initial focus. Non-intrusive observations, structured interviews, and performance data generated by SIMNET will be collected and analyzed. A process model will be developed that predicts the performance of critical collective tasks, in terms of underlying skills/knowledge. Skill acquisition parameters in the model will project growth patterns of crew and platoon performance. For individual skill reacquisition, hands-on performance and written-test knowledge, data will be collected from individual ready reservists participating in the Call Forward series of mobilization training exercises. A skill reacquisition model will be developed that predicts the amount of training required to attain proficiency as a function of task characteristics, separation interval, and personnel variables, such as AFQT score. The model developed here will enable mobilization planners to prepare rapid-train up packages for ready reservists who have been separated from active duty for periods of up to 3 years.

**PROGRESS:**

Defined the critical variables for collective skill acquisition and retention, and developed preliminary collective skill acquisition process models

Collected performance data on individual ready reservists participating in Call Forward 93 at Fort Leonard Wood

Initiated data collection on acquisition and retention of at least six Armor platoon tasks on SIMNET. Tested predictive accuracy of collective acquisition and retention model

Collected data on individual skill reacquisition during exercises at Fort Dix.  
Developed and tested first version of individual skill reacquisition model

**FY93 MILEST ES: N/A**



**PROJECTED TECHNOLOGY:**

**FY95**

**Validated model for projecting skill acquisition and decay curves for platoon level collective tasks**

**Model for predicting amount of retraining necessary to upgrade individual skills for soldiers who have left active duty**

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**IV.J.8 Cognitive and Collective Skill Retention**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY92**

**END DATE: FY95**

**FY95 FUNDING (\$000): \$371    PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Advanced Training Methods**

**POC: Dr. Robert Seidel, (703) 274-8838; DSN 284-8838**

**TASK TITLE: DESYNE: Technology for Designing Collective Training in Synthetic Environments (2113)**

**OBJECTIVE:** To design strategies and associated methods for collective training of crews and teams in real-time synthetic combat environments (e.g., Close Combat Tactical Trainer, CCTT).

**APPROACH:** The emergence of Distributed Interactive Simulations technology provides a unique opportunity to conduct research on individuals and teams/crews under controlled, yet realistic conditions of simulated combat. Initial experiments will be conducted to determine which training features of the CCTT facilitate skill acquisition, as measured by rate and level of skill development. Subsequent research will examine the utility of various tactical knowledge training methods within CCTT exercises. Specific research issues include: (a) methods for generating collective training scenarios to address specific key training needs, (e.g., varying performance difficulty level by varying the enemy threat and/or the time provided to plan and prepare); (b) instructional features (e.g., pacing, sequencing, use of massed vs. spaced practice, and type of feedback); and (c) the use of "shared mental models" to train collective tasks. Guidelines will be developed that demonstrate transfer of the knowledge gained from these experiments to the operational designers of collective training scenarios.

**PROGRESS:**

Model of the expert training designer and developer (i.e., description of tasks and procedures used by experts)

Created networked synthetic environment testbed for collective training research

Designed training strategies and methods for facilitating the acquisition of collective skills

Conducted experiments on cooperative learning and on use of shared mental models as a training strategy for facilitating the acquisition of collective skills

Designed guidelines for developing collective training scenarios using shared mental models, and cooperative learning techniques

**FY95 MILESTONES:** N/A

**PROJECTED TECHNOLOGY:**

**FY95**

Prototype training strategy and method for facilitating the acquisition of collective skills in DIS environments (e.g., rules for use of shared mental models for training)

**FY96**

**Recommended instructional dimensions for DIS training strategies (e.g., task complexity)**

**FY97**

**Guidelines for the design of collective training scenarios**

**Demonstration of DIS training strategy and associated methods**

\*\*\*\*\*

**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**III.Q.2 Unit Training Strategies**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY92**

**END DATE: FY97**

**FY95 FUNDING (\$000): \$272 PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Advanced Training Methods**

**POC: Dr. Robert Seidel, (703) 274-8838; DSN 284-8838**

**TASK TITLE: TAMPIT: Technologies for Advanced Military Police Immersion Training (2119)**

**OBJECTIVE:** To increase the effectiveness and reduce the cost of training Military Police Officers through the use of advanced immersion technologies.

**APPROACH:** As part of its increasing role in peacekeeping and operations other than war (OOTW), Military Police (MP) in OCONUS require training that differs significantly from that required for combat tasks. The military police must act with restraint and deal intimately with the local community to perform their peacekeeping mission in multi-national and multi-cultural environments. The major functions of MPs include actions that can be characterized as responding to visual stimuli, giving verbal orders, and engaging in relatively unpredictable dialogues with foreigners. Such tasks can be trained more effectively in a stimulated, immersion environment where MPs can try out alternative courses of action and see and hear the results of those choices. This research seeks to create a training system consisting of a combination of technologies to achieve this goal these include: natural language processing (to support dialogue); speech recognition and synthesis (to support spoken exchange; animated graphics or virtual reality (to support visual interaction); knowledge data base development programs (to support a wide variety of scenarios). System architecture will consist of personal computers that can function as individual trainers, and be networked together to train MP collective tasks. The overall approach will be to leverage existing technologies by making maximum use of DoD and commercial software. A significantly upgraded version of ARI's Military Language Tutor (MLT) will serve as the initial training research platform.

**PROGRESS:** New Start

**FY95 MILESTONES:** N/A

**PROJECTED TECHNOLOGY:**

**FY96**

Detailed training system design for individual MP trainer

**FY97**

Prototype individual MP training system including training modules

**FY98**

Design for MP unit trainer

Tested and debugged individual MP trainer

**FY99**

**Prototype MP unit trainer including training modules**

**FY00**

**Tested and debugged MP unit training system**

**\*\*\*\*\***

**SCIENCE AND TECHNOLOGY OBJECTIVE (STO): N/A**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Training Systems**

**\*\*\*\*\***

**START DATE: FY95**

**END DATE: FY01**

**FY95 FUNDING (\$000): \$344**

**PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Advanced Training Methods**

**POC: Dr. Robert Seidel, (703) 274-8838; DSN 284-8838**

**TASK TITLE: MOSES: Military Operational Simulation and Evaluation Systems  
(2122)**

**OBJECTIVE:** To design and demonstrate a decision support methodology that allows commanders to design improved Army training strategies for brigade and above by comparing mixes of training alternatives, based on data from computer-supported battle rehearsals and simulations.

**APPROACH:** Training management models using computer-supported methods will be developed which can help commanders decide on the most effective strategy to train and prepare units for combat. The first stage of this effort will be to develop (or adapt), apply, and demonstrate techniques for identifying and defining tasks for large unit training, assessment, and feedback. This includes: (a) deriving lists of unit collective tasks and candidate assessment/feedback techniques, and (b) having SMEs screen matches of tasks and feedback techniques to test their meaningfulness, relevancy, and applicability to unit training practices. The next step will be to design, test and demonstrate methodologies for generating and evaluating tradeoffs among mixes of training alternatives (e.g., training aids, devices, simulators, and simulations (TADSS)), as a function of costs and performance benefits. Current and evolving technologies, such as Distributed Interactive Simulations (DIS), interactive models, and I-MILES, will be mapped to training events and tasks, by using statistical approaches, such as response surface analysis and linear programming.

**PROGRESS:**

Methodology and identification of task clusters for brigade training strategies

Multi-Service Distributed Training Testbed (MDT2) incorporating close air support training scenarios

Measures of brigade performance (e.g., synchronization)

**FY95 MILESTONES:** N/A

**PROJECTED TECHNOLOGY:**

**FY95**

Computer program for matrixing interrelated brigade tasks and task clusters to performance indicators, training events, and training resources (e.g., TADSS)

Guidelines for development and conduct of multi-service training in a distributed interactive simulation environment

**FY96**

**Methodology for commanders to use in developing cost-effective brigade and multi-service training program plans and schedules**

**\*\*\*\*\***

**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**III.Q.2 Unit Training Strategies**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY92**

**END DATE: FY96**

**FY95 FUNDING (\$000): \$670 PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Advanced Training Methods**

**POC: Dr. Robert Seidel, (703) 274-8838; DSN 284-8838**

**TASK TITLE: STRATA-FI: Simulation Fidelity Requirements for Cost-Effective Aviation Training (2211)**

**OBJECTIVE:** To conceptualize and test models for predicting the fidelity of simulator stimulus-response variables essential for designing cost-effective training strategies.

**APPROACH:** The costs and training effectiveness of unit-based aviation training programs are largely influenced by trade-offs between simulator fidelity, with low costs for operation, and field training with high realism but also high OPTEMPO costs. Thus, it is of vital importance to Army aviation to determine the value of different levels of fidelity for training critical Army aviator tasks. Using ARI's state-of-the-art Simulator Training Research Advanced Testbed for Aviation (STRATA) as the primary research tool, all parameters of consequence to simulator design will be varied to determine their relative contribution to skill development and retention for rotary wing aviation tasks. This research will be accomplished on a task by task basis to determine the level of fidelity required to support design of training strategies for units and for the acquisition of new skills in simulators. Findings will allow training program designers to define the lowest costs for elements of training programs and for simulation systems required to effectively train the full spectrum of Army aviation tasks. In addition, experiments will be performed to assess the degree to which simulator design features affect transfer of training to actual aircraft task performance. Experiments will address the level of modularity and complexity required for networked and combined arms combat training as a part of the Combined Arms Training Strategy.

**PROGRESS:**

The STRATA system was assembled, tested, and accepted at the contractor's facility, and delivered to Fort Rucker in May 1992

Experiments were conducted to: evaluate the training implications of Night Vision Goggles (NVGs) with integrated heads-up displays; validate the AH-64 simulation from both a psychophysical and handling qualities perspective

Determined the database texture requirements for nap-of-the-earth helicopter flying

Determined visual scene content requirements for helicopter-gunnery training

Examined helmet-mounted display system capabilities for various flight tasks

**FY95 MILESTONES:**

Helmet-Mounted Display and image generator requirements for modular transportable training simulator

Rules that determine the tactical behavior of automated forces in a real-time combat environment for team and unit level training simulators



Virtual reality system requirements for mission preview training for weapon system and ordnance delivery in unfamiliar terrain

Helicopter subsystem simulation fidelity requirements for crew tasks and team training (Apache, Longbow, Comanche)

**PROJECTED TECHNOLOGY:**

**FY96**

Display resolution requirements for task training in helicopter flight simulators

**FY98**

Aviation task training requirements for using helmet mounted displays

Visual and other sensory requirements for training aviation tasks using networked virtual reality training environments

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**IV.J.5 Combined Arms Training Strategy for Aviation**

**TECHNOLOGY DEMONSTRATION:**

Simulator Training Research Testbed for Aviation - FY95

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY93**

**END DATE: FY98**

**FY95 FUNDING (\$000): \$1656 PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Rotary-Wing Aviation**

**POC: Mr. Charles Gainer, (205) 255-2834; DSN 558-2834**

**TASK TITLE: TANTAMOUNT: Technologies for Advanced Mounted Warfare Training  
(2221)**

**OBJECTIVE:** To design, develop and demonstrate simulation-based training and performance assessment technologies for commanders of advanced mounted combined arms teams, focusing on tasks which employ integrated battlefield sensors and automated command, control and communication (C<sup>3</sup>) systems. This effort will design and develop technologies to address issues associated with the digitized battlefield of the future.

**APPROACH:** New training technologies will be designed, developed and demonstrated to prepare operators and commanders to take maximum tactical advantage of the advanced capabilities afforded by digitized C<sup>3</sup> systems designed for use on fast-paced, dispersed battlefields. This research will: (a) develop technologies to support the Mounted Warfighting Battlespace Lab (MWBL) in executing advanced warfighting demonstrations (b) specify the simulation capabilities required to immerse operators and commanders in this digitized warfighting environment, (c) determine tasks and training needs associated with these new systems, (d) develop and demonstrate technologies for training the tasks required, and e) develop measures to assess performance and provide feedback using distributed soldier-in-the-loop simulation.

**PROGRESS:**

Prototype methods for training and assessing future tactical command and control skills

Combat Vehicle Command and Control Systems: Training implications based on company level simulations

Training requirements analysis for Combat Vehicle Command and Control System Tactical Operations Center

Description of a tank-based automated command and control system as simulated for the Combat Vehicle Command and Control program

Reconfigurable simulator specifications for future main battle tanks within the Close Combat Test Bed

Guidebook for research on Distributed Interactive Simulation (DIS) utilities to support conduct of training, performance evaluation, and training feedback

Performance measures for use in simulations

**FY95 MILESTONES:**

Assess, in simulation, the soldier performance and training requirements for a prototype force protection system

Provide initial assessment of commanders' performance using prototype automated command and control capability in networked simulation

**PROJECTED TECHNOLOGY:**

**FY96**

Training technologies for information distribution on future digitized, combined arms battlefields

**FY97**

Prototype company team training techniques for future digitized battlefield systems

**FY00**

Training technologies and strategies for companies possessing Force XXI digitized capabilities

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO): N/A**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY94                      END DATE: FY01**

**FY95 FUNDING (\$000): \$499    PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Armored Forces Training**

**POC: Dr. Barbara Black, (502) 624-3450; DSN 464-3450**

**TASK TITLE: NIGHTFIGHTER: Training Technologies for Night Operations (2223)**

**OBJECTIVE:** To develop and demonstrate training concepts and technologies that will improve the ability of Light Infantry units to fight at night.

**APPROACH:** This research focuses on new technologies for identifying the critical problems at night for ground forces and on training technologies to reduce these problems. The first phase is development of a front-end analysis (FEA) technology for rigorously identifying Light Infantry problems at night, the reasons for these problems, and possible fixes. Multiple techniques (surveys, interviews, field observations, content analysis) will be developed to ensure a comprehensive examination of problem areas. The FEA methodology will be validated with Light Infantry missions and tasks. The second phase is the development and demonstration of training technologies, simulations, and job aiding techniques to enhance the ability of Light Infantry units to execute and sustain the difficult night tasks identified from application of the FEA method. This will include experiments with training technologies using light filtering technology, night photography, digitized forward looking infrared video, and simulations to improve the unaided and aided night vision capabilities of soldiers and units while executing mission tasks such as reconnaissance, movement, fire support, and assault. Techniques for measuring proficiency of critical night skills will be developed. Field evaluations of the training and assessment technologies will be conducted. This research supports primary missions of the Dismounted Battlespace Battle Lab (DBBL).

**PROGRESS:**

Validated FEA methodology for Light Infantry night missions

Developed and evaluated effectiveness of unaided night vision training program for ground forces

Developed and evaluated aim light zeroing procedures

**FY95 MILESTONES:**

Develop and evaluate field expedient procedure for adjusting night vision goggles to maximize visual acuity

Conduct experiments on night vision goggle performance and use

Conduct training experiments on thermal target acquisition skills

**PROJECTED TECHNOLOGY:**

**FY96**

Training technologies for using image intensification devices and forward looking infrared sensors which will enhance unit command and control and accurate firing at night

**FY98**

Innovative training and measurement techniques for improving performance at night

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**III.Q.2 Unit Training Strategies**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY92**

**END DATE: FY98**

**FY95 FUNDING (\$000): \$293 PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Infantry Forces**

**POC: Dr. Thomas Thompson, (706) 545-5589; DSN 835-5589**

**TASK TITLE: MULTI-LINGUAL: Advanced Technologies for Mastering Foreign Languages (2231)**

**OBJECTIVE:** To develop and demonstrate innovative instructional approaches and tutoring technologies which will improve acquisition and retention of foreign language skills, based on an improved understanding of the processes by which native English speakers acquire and retain second languages.

**APPROACH:** A set of experiments will be conducted to: (a) Develop theoretical frameworks and cognitive models of second language acquisition and retention including individual differences in learning style; (b) Identify the major dimensions of second language acquisition and retention, and develop a computer-based research device (tutor) to be used to vary: tutoring rules (diagnosis, prescription, and remediation); student error feedback (e.g., frequency, type); immersion variables (e.g., dialogues, scenarios); modalities (visual, auditory); and cognitive task demands (e.g., exercise type); (c) Develop novel instructional approaches utilizing combinations of these dimensions in computer-based tutors for second language acquisition and retention.

**PROGRESS:**

Method for using a parser to create a dynamic student model

First generation German language tutor as research environment for studying acquisition and retention

Instructional display screens for prototype Arabic and Spanish tutors

Second generation Spanish and Arabic tutors for research on acquisition and retention within and across languages

Spanish and Arabic parsers, computational lexicons, and knowledge bases to support an immersion environment for language training

Evaluation of tutoring rules and their interaction with individual learning styles

**FY95 MILESTONES:** N/A

**PROJECTED TECHNOLOGY:**

**FY95**

Portable, computer-based tutoring technology incorporating experimentally-proven combinations of instructional variables

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**IV.J.6 Foreign Language Skill Training**

**TECHNOLOGY DEMONSTRATION:**

**Portable Computer-Based Foreign Language Tutor - FY95**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY89**

**END DATE: FY95**

**FY95 FUNDING (\$000): \$245 PROGRAM ELEMENT/PROJECT: 62785 A791**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Advanced Training Methods**

**POC: Dr. Robert Seidel, (703) 274-8838; DSN 284-8838**

## **APPENDIX B**

### **Technology Transition: Advanced Development (6.3A)**



**Manpower and Personnel Tasks  
(1.1 - 1.3)**

**Advanced Development**

**TASK TITLE: BATTLE COMMAND: Improving Commander and Staff Effectiveness  
(1122)**

**OBJECTIVE:** To determine key factors in the effectiveness of tactical and operational unit commanders and their staffs, with an emphasis on the impact of doctrine, training, and organizational influences, and to validate recommended organizational designs, procedural changes, training strategies, and decision tools for achieving effective battle command. To preserve the Warfighter Exercise (WFX) data necessary to determine key factors in the effectiveness of tactical and operational unit commanders and their staffs.

**APPROACH:** Input of complete data sets from three Battle Command Training Program (BCTP) exercises has been completed. This research will further develop and implement a database containing observations and lessons learned from BCTP exercises as well as the data from ARI's Army Command and Control Evaluation System (ACCES) project. The database of scenario and performance data will be established in conjunction with the Center for Army Lessons Learned to provide a performance effectiveness baseline. Technology base research and analyses of performance trends in the data base will suggest changes in doctrine, procedures, organization, and simulation-based training strategies; such recommendations will be implemented in selected units for evaluation and validation.

**IMPACT:** The objective performance assessment tools, and the methods, procedures, and tools for organizational design will support the systematic adaptation of Army battle command to technological and doctrinal change. Research products will support changes in staff training, leader development, command staff design, and command staff training strategies. The data base will support the systematic adaptation of Army battle command to technological and doctrinal change.

**PROPONENT/SPONSOR:** Combined Arms Command - Battle Command Battle Laboratory, TRADOC

**TECHNOLOGY TRANSFER:**

**Progress:** A preliminary design for a division-level performance data base (BCdb) and input of complete data sets from three Battle Command Training Program (BCTP) exercises is complete. ACCES, including complete training materials and analysts' guides, was available for use by BCBL, BCTP and the Louisiana Maneuvers project in 1994 as a tool to guide observations and data collection by observers and evaluators. Span-of-control guidelines for organizational design and unit task organization were provided to the BCBL in 1994.

**Future Products:** CALL is planning to use the ARI BCdb to identify significant issues and lessons learned emerging from BCTP and other exercises. This in turn will provide information for other elements of the Combined Arms Command investigating needed changes in tactical and operational doctrine, organization and procedure. Preliminary findings on determinants of battle command performance will be provided to BCBL in 1996, with final recommendations on organizational design and

simulation-based training strategies provided to BCBL and CAC-T in 1998. Decision aid evaluation methodologies will be applied and evaluated for their utility in assessing the impact of organizational change, with recommendations provided to BCBL in FY96. Recommendations for leader development and organizational design techniques will be implemented and evaluated in FY97.

**FY95 MILESTONES:**

The functional BCTP data base will be integrated into the Louisiana Maneuvers Task Force (LAM TF) data base

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

IV.J.9 Human Dimensions of Battle Command

TECHNOLOGY DEMONSTRATION: N/A

DEFENSE TECHNOLOGY AREA: Manpower and Personnel

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START DATE: FY93

END DATE: FY98

FY95 FUNDING (\$000): \$776 PROGRAM ELEMENT/PROJECT: 63007 A792

DIVISION: Manpower and Personnel Research Division

RESEARCH UNIT:

Fort Leavenworth

ACTIVITY: TRADOC (CAC-CD/BCBL)

ARI

POC: BG Anderson  
DCG for Combat  
Developments and  
Director, Battle Command  
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(913) 684-2243  
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Dr. Stan Halpin  
(913) 684-4933  
DSN 552-4933

**TASK TITLE: Controlling Organizational Change (1124)**

**OBJECTIVE:** To enable decision makers, commanders, individual soldiers, and families to deal effectively with Army organizational changes.

**APPROACH:** This effort will develop research-based prototype methods, leader tools, and management aids for dealing with changes in the Army such as: demographic composition, the assignment of women, downsizing, mobilization, force structure, and assignments to operations other than war missions. These methods and aids will then be evaluated and modified to produce implementable tools for decision makers, commanders, individual soldiers, and Army families. A major thrust in the early years of this task will focus on examining the formation, training, deployment, and re-entry into civilian life of the Chief of Staff of the Army directed National Guard MFO Battalion peacekeeping deployment to the Sinai. Initial levels of unit cohesion, soldier motivation, and leader cohesion and their subsequent changes over the course of training, deployment, and re-integration into normal Guard units will be assessed. Family support issues and marital stability will also be evaluated during all major phases of the operation. Finally, we will investigate issues concerning who volunteered for the mission and why they volunteered. We will also explore what happened to those who volunteered in terms of their: commitment to the Guard/Reserve, willingness to serve in this and other types of operations other than war in the future, and adjustment to civilian life.

**IMPACT:** The tools developed in this task will assist decision makers and commanders to adjust Army personnel systems to the demands of various organizational changes. The formation and aids developed will also help individual soldiers and their families to meet the challenges of a changing Army.

**OPONENT/SPONSOR:** DCSPER, PERSCOM, TRADOC, FORSCOM, NGB, OCAR

**TECHNOLOGY TRANSFER:**

**Progress:** New Start

**Future Products:** Methods and aids for helping downsizing survivors adjust to organizational changes will be available in FY96. Also in FY96, base line measures of unit cohesion and soldier motivation for MFO units will be ready. In FY97, we expect to have a spouse's handbook for Operations other than War. Methods for assessing and managing gender barriers to leader development are projected for FY98. By FY00, we expect to have measures of the long-term effects of peacekeeping operations on organizations and individuals.

**MAJOR MILESTONES:**

Evaluation of who volunteered for the Sinai deployment and why

Description of family support system for MFO

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SCIENCE AND TECHNOLOGY OBJECTIVE (STO): N/A

TECHNOLOGY DEMONSTRATION: N/A

DEFENSE TECHNOLOGY AREA: Manpower and Personnel

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START DATE: FY95            END DATE: FY01

FY95 FUNDING (\$000): \$543    PROGRAM ELEMENT/PROJECT: 63007 A792

DIVISION: Manpower and Personnel Research Division

RESEARCH UNIT:

    Organization and Personnel Resources

ACTIVITY: ARI

POC:            Dr. Paul Gade  
                 (703) 274-8866  
                 DSN 284-8866

**TASK TITLE: CAREER FORCE: Building the Career Force (1212)**

**OBJECTIVE:** Develop improved enlisted personnel procedures which will (1) select the right people, (2) put these people in the jobs they are most suited for, and (3) retain and promote the right people.

**APPROACH:** This research continues to track enlisted soldiers originally tested on general and specific aptitude measures, and then assessed on training and job performance during their first tour and into their second tour. This task refined and administered second tour measures of soldier performance, and will (1) conduct research linking entry test performance to performance at the end of training, during first tour, and in second tour, in order to identify the best combination of tests for effective selection and classification; and (2) determine the best measures to use for reenlistment and promotion decisions.

**IMPACT:** This effort will substantially improve a selection and classification system which, ARI in 1989 estimated, produces annual benefits to the Army of \$250 million in terms of improved performance. Benefits will also accrue from improved promotion and reenlistment decisions. Those soldiers who are chosen as junior NCOs provide leadership and continuity critical to the Army's success on the battlefield. This effort will link those decisions to proven indicators of future success.

**PROPONENT/SPONSOR:** Director of Military Personnel Management (DMPM),  
ODCSPER

**TECHNOLOGY TRANSFER:**

**Progress:** Results of a previous major effort, new aptitude area composites and the validation of the Army's selection and classification measures against first-tour performance were delivered in FY84 and FY86, respectively. In FY94, ARI delivered to DMPM, ODCSPER, new selection and classification tests incorporating psychomotor and spatial measures, with preliminary recommendations for their implementation. ARI also delivered to DMPM in FY94 a recommended set of ratings and hands-on, knowledge, and administrative measures for predicting second tour performance, a preliminary set of recommended procedures for implementing those measures and a set of second tour performance measures.

**Future Products:** N/A

**FY95 MILESTONES:**

Determination of optimal selection battery for predicting performance through first and second tours

Determination of optimal assessment battery for predicting attrition

ARI will provide comprehensive recommendations for modifications to the selection and classification and reenlistment and promotion systems based on the Career Force findings

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SCIENCE AND TECHNOLOGY OBJECTIVE (STO):

III.Q.1 Soldier Assignment

TECHNOLOGY DEMONSTRATION:

Selection and Classification for High Performing Soldiers - FY97

Selecting the Warrior - FY97

DEFENSE TECHNOLOGY AREA: Manpower and Personnel

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START DATE: FY89

END DATE: FY95

FY95 FUNDING (\$000): \$337 PROGRAM ELEMENT/PROJECT: 63007 A792

DIVISION: Manpower and Personnel Research Division

RESEARCH UNIT:

Selection and Assignment

ACTIVITY: DCSPER (DMPM)

ARI

POC:

Mr. Ron Patsy  
Enlisted Accessions  
Division  
DSN 225-0836

Dr. Michael Rumsey  
(703) 274-8275  
DSN 284-8275

**TASK TITLE: NEW MOS: Military Occupational Specialty (MOS)  
Restructuring (1213)**

**OBJECTIVE:** To develop guidelines and procedures for identifying and evaluating job restructuring options for Army Military Occupational Specialties (MOSs) and Career Management Fields (CMFs).

**APPROACH:** Develop methods to assess comparability of jobs in terms of (1) knowledge required for task performance, (2) required abilities, and (3) task difficulty, importance, and frequency. Determine resource constraints which impact on restructuring decisions. Develop methods to combine information on job comparability and resource constraints to guide restructuring decisions.

**IMPACT:** The developed job restructuring methods and procedures will result in MOS and CMF design decisions that will help optimize the Army's ability to adequately man the current and proposed inventory of systems within the available supply of soldiers.

**PROPONENT/SPONSOR:** U.S. Total Army Personnel Command (PERSCOM), ODCSPER

**TECHNOLOGY TRANSFER:**

**Progress:** In FY93 ARI MOS Restructuring tools were used to develop recommendations for restructuring a set of Field Artillery MOS. These recommendations were provided to the Field Artillery School and to PERSCOM. In FY94, ARI began development of a set of guidebooks to describe the decision support technology which is comprised of the full set of these tools and explains in detail a key component, which identifies required knowledge for each job task.

**Future Products:** In FY96 ARI will make recommendations concerning how the Army Occupational Survey Program could be used in the restructuring process.

**FY95 MILESTONES:**

Complete development of MOS Restructuring Guidebooks and delivery to PERSCOM

Preliminary evaluation of potential utility of Army Occupational Survey Program in MOS Restructuring

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

III.Q.1 Soldier Assignment

**TECHNOLOGY DEMONSTRATION:** N/A



**DEFENSE TECHNOLOGY AREA: Manpower and Personnel**

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**START DATE: FY89**

**END DATE: FY96**

**FY95 FUNDING (\$000): \$203    PROGRAM ELEMENT/PROJECT: 63007 A792**

**DIVISION: Manpower and Personnel Research Division**

**RESEARCH UNIT:**

**Selection and Assignment (Brooks AFB)**

**ACTIVITY:**

**ODCSPER (PERSCOM)**

**ARI**

**POC:**

**Ms. K. Keefer  
Chief, Military  
Occupational Structures  
Branch  
(703) 325-3211**

**Mr. Gabriel Intano  
(210) 536-3256  
DSN 240-3256**

**TASK TITLE: TOMORROW'S WARRIOR: Army Selection and Classification:  
General Models and MOS-Specific Needs (1222)**

**OBJECTIVE:** (1) Determine the most cost-effective combination of tests for Army selection and classification. (2) Develop the best selection and classification procedures for classes of MOS with special needs, such as armor and infantry.

**APPROACH:** Research to develop the most cost-effective combination of tests for Army selection and classification will: (1) describe existing procedures in terms of testing stages and activities, across all Services; (2) formulate alternative combinations; and (3) evaluate the alternative combinations in terms of costs. Research on specific MOS groupings includes: (1) refinements of psychomotor, spatial and temperament measures; and (2) trial use of psychomotor and spatial tests in infantry, armor, and field artillery specialties.

**IMPACT:** Improved selection and classification procedures such that each individual's abilities will be optimally matched to MOS requirements. Improved matching will result in minimal attrition and optimal job performance.

**PROPONENT/SPONSOR:** Director of Military Personnel Management (DMPM), ODCSPER

**TECHNOLOGY TRANSFER:**

**Progress:** In FY93, ARI briefed the DCSPER on progress toward development of alternative selection and classification models and on results from trial use of psychomotor and spatial tests in infantry and armor specialties. ARI also recommended steps toward implementing a psychomotor test for Infantry and Armor selection. The DCSPER authorized ARI to proceed with its plan. Also in FY93, ARI received support from the DCSPER to proceed with an initial test of a Compensatory Screening Model to be used to select non-high school graduates. In FY94, ARI briefed the DMPM and OASD on the determination of the most cost-effective combination of tests for Army selection and classification and began proceeding with the plan briefed to the DCSPER in FY93 on research to support implementation of a psychomotor test, two spatial tests, and a temperament measure.

**Future Products:** In FY95 ARI will proceed with the plan briefed to the DCSPER in FY93 on research to support implementation of several new measures for selection and classification purposes. These research efforts will be completed by FY96, at which time implementation decisions can be made.

**FY95 MILESTONES:**

Development of a Compensatory Screening Model for soldiers in targeted AFQT categories

Begin administration of a modified one-hand tracking test for use in Infantry and Armor selection

Integrate cost-effectiveness information with Career Force information to generate broad recommendations regarding changes to the enlisted selection and classification system

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

III.Q.1 Soldier Assignment

**TECHNOLOGY DEMONSTRATION:**

Selecting the Warrior - FY97

**DEFENSE TECHNOLOGY AREA:** Manpower and Personnel

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**START DATE:** FY89

**END DATE:** FY96

**FY95 FUNDING (\$000):** \$210 **PROGRAM ELEMENT/PROJECT:** 63007 A792

**DIVISION:** Manpower and Personnel Research Division

**RESEARCH UNIT:**

Selection and Assignment

**ACTIVITY:** ODCSPER (DMPM)

ARI

**POC:** Mr. Ron Patsy  
Enlisted Accessions  
Division  
(703) 695-0836

Dr. Michael Rumsey  
(703) 274-8275  
DSN 284-8275

**TASK TITLE: SPECIAL FORCES: Improving Special Forces Personnel Selection and Management (1223)**

**OBJECTIVE:** Develop models, career management strategies, and measurement technology to enable the Special Operations Command to select high performing soldiers for Special Operations careers and manage their progression within Special Operations Forces (SOF).

**APPROACH:** Identify the factors associated with high performing SOF soldiers, develop background data and situational test measures tapping these constructs, verify that there is a commonality of constructs across SOF units, and construct a model to permit early identification and systematic development of soldiers with special operations potential. In previous work, ARI has identified constructs central to successful performance and has developed measures of these constructs. Current work consists of refinement of measures. Subsequent work will consist of data base development to provide long-term validation of measures and monitoring of the development system.

**IMPACT:** This research will provide USASOC with tools to enable more efficient selection of soldiers applying to SOF units, and, in the event the sustaining base cannot support the SOF unit structure, will enable alternative approaches to recruiting, selecting, and developing SOF soldiers.

**PROPONENT/SPONSOR:** U.S. Army Special Operations Command (USASOC)

**TECHNOLOGY TRANSFER:**

**Progress:** In FY92, factors theoretically predictive of high soldier performance were identified, and prototype background data instruments were developed. A pilot administration in the Special Forces Assessment and Selection Course produced a multiple correlation of .51 against a success/failure criterion. A comprehensive job analysis has been conducted across multiple Special Forces jobs which will serve as a basis for development of performance measures and evaluation of the comprehensiveness of the current set of operational and experimental selection measures.

**Future Products:** Final forms of selection instruments validated against performance in selection courses and after assignment to units; data base for long-term tracking of soldier progression in SOF careers and validation of selection instruments; model to guide formulation of alternative approaches to manning the SOF. Operational selection instruments will be completed by FY96.

**FY95 MILESTONES:**

Job performance measures for SOF

Data base structure for validation against long-term performance in SOF units

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**III.Q.1 Soldier Assignment**

**TECHNOLOGY DEMONSTRATION:**

**Special Forces Warrior - FY96**

**DEFENSE TECHNOLOGY AREA: Training System**

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**START DATE: FY91**

**END DATE: FY96**

**FY95 FUNDING (\$000): \$134 PROGRAM ELEMENT/PROJECT: 63007 A792**

**DIVISION: Manpower and Personnel Research Division**

**RESEARCH UNIT:**

**Selection and Assignment**

**ACTIVITY:**

**USASOC**

**ARI**

**POC:**

**Mr. Robert Mountel  
DSN 239-1420**

**Dr. Michael Rumsey  
(703) 274-8275  
DSN 284-8275**

**TASK TITLE: SPECIAL FORCES: Special Forces Personnel Development (1224)**

**OBJECTIVE:** Develop methods, models, and strategies to enhance the ability of Special Forces to recruit, train, and retain highly performing soldiers.

**APPROACH:** ARI conducted a research needs analysis to identify important research issues for SF personnel development. Based on those findings and sponsor priorities, ARI conducted preliminary research on SF recruiting, assessment, training attrition, and job performance. We are now developing and evaluating new methods to attract high potential soldiers, improve SF training, reduce training attrition, and enhance personnel development.

**IMPACT:** This research will provide USASOC with better prepared recruits and higher performing soldiers through recruiting innovations, improved assessment procedures, and more efficient training methods. Many of the findings and implementation strategies should also be transferable to the rest of the Army, yielding enhanced soldier performance overall.

**PROPONENT/SPONSOR:** U.S. Army Special Operations Command (USASOC) and U.S. Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS)

**TECHNOLOGY TRANSFER:**

**Progress:** New start

**Future Products:** Analysis of peer and trainer assessments of leadership potential. Updated Longitudinal Research Database. Prototype training aids/materials for enhancing intercultural communication skills. Prototype training aids/materials for mission planning.

**FY95 MILESTONES:**

Evaluation of a Realistic Job Preview for SF recruits

Review of intercultural communication training

Analysis of cognitive factors related to successful mission planning

Analysis of factors related to SFQC attrition

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):** NA

**TECHNOLOGY DEMONSTRATION:** NA

**DEFENSE TECHNOLOGY AREA:** Manpower and Personnel

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START DATE: FY95            END DATE: FY01

FY95 FUNDING (\$000): \$562 PROGRAM ELEMENT/PROJECT: 63007 A792

DIVISION: Manpower and Personnel Research Division

RESEARCH UNIT:

Organization and Personnel Resources  
Fort Bragg Scientific Coordination Office

ACTIVITY:            USASOC                            ARI

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**TASK TITLE: ARMY AVIATOR: Integrated System for Selection and Classification of Aviator Candidates (1225)**

**OBJECTIVE:** Develop a new approach to aviator accession based on the projected state of Army aviation for the next 20 years, which uses advanced methods for assessing relevant personal attributes, advanced decision models and management of training assets.

**APPROACH:** Prior research in this area involved preliminary evaluations of several personality inventories for development of a specific instrument to supplement the current classification battery. The classification algorithm was modified to accommodate a change in the Initial Entry Rotary Wing training program. The classification scheme can potentially be extended to include several new aircraft types. Near-term requirements will be met to accommodate current developments in aviation assets and training programs by adaptation of existing accession components. A projected state of Army Aviation in terms of missions, mission equipment and personnel requirements will be derived from this and related research. Test batteries for selection and classification will be developed using adaptations of existing and emergent methodologies to measure a candidate attribute set. Decision models using linear and nonlinear assumptions regarding attribute relationships will be developed for selection, classification, remediation and elimination. A student flow management model will be developed using expert systems and appropriate applications of linear and nonlinear programming techniques.

**IMPACT:** This research will improve selection and classification procedures to achieve optimal assignment of aviator candidates to aircraft in order to maximize successful completion of careers as Army Aviators. The result will be reduced attrition in training and in service, reduced training costs, and increased readiness.

**PROPONENT/SPONSOR:** U.S. Army Aviation Center (USAAVNC)

**TECHNOLOGY TRANSFER:**

**Progress:** New Start

**Future Products:** In FY96 ARI will provide USAAVNC and PERSCOM with software to optimally assign aviators to aircraft qualification courses. In FY96 and FY97, ARI will develop computer-based decision aids for optimal assignment of students and aviators within the USAAVNC training programs under a two-stage classification scheme. These interim products will be supplanted in FY98 with a software package designed to provide automated assignment of students to training racks, assign aviators in training and in operational units to aircraft qualification courses, provide early detection of students at risk for failure, and ensure appropriate management of student flow to match availability of training assets.



## **FY95 MILESTONES:**

Projection of Army Aviation developments for a 20 year period to anticipate changes in required Army Aviator attributes and enable development of measures for them

Preliminary validation of personality inventory battery for classification of aviator candidates

Extension of methodology for individual attribute-based assignment of aviators to AH064, OH-58D, and CH-47 aircraft

Interim method and procedures for two-stage classification of aviator candidates and aviators to achieve optimal match of aptitudes with operational aircraft types

Complete set of computer programs that will provide USAAVNC tools for optimally assigning aviator candidates to training aircraft under a new dual-track training program of instruction

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO): N/A**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Manpower and Personnel**

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**START DATE: FY95            END DATE: FY98**

**FY95 FUNDING (\$000): \$74    PROGRAM ELEMENT/PROJECT: 63007 A792**

**DIVISION: Manpower and Personnel Research Division**

**RESEARCH UNIT:**

**Rotary-Wing Aviation**

<b>ACTIVITY:</b>	<b>ODCSPER (DMPM)</b>	<b>ARI</b>
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# **Training Systems Tasks** **(2.1 - 2.2)**

## **Advanced Development**

**TASK TITLE: SYNTRAIN: Development of Advanced Training Technologies for Distributed Interactive Simulation (DIS) Systems (2114)**

**OBJECTIVE:** To develop and demonstrate a training and performance measurement and feedback design technology that takes full advantage of current and emerging distributed interactive simulation (DIS) systems to improve the effectiveness and efficiency of Combined Arms Unit Training (i.e., design the DIS component of the Combined Arms Training Strategy (CATS)).

**APPROACH:** Distributed Interactive Simulation, or DIS, provides the Army with an opportunity to increase training readiness while reducing costs for live ammunition, fuel, and weapons systems maintenance, and for avoiding real-world safety hazards. However, DIS cannot be designed to recreate the physical conditions found in field training or in combat operations. This effort will develop the training design principles to optimize the cost and training effectiveness of DIS. An ARI-developed Unit Performance Assessment System (UPAS), a method for measuring performance and providing training feedback in networked simulators, will serve as a basis for further research. Lessons Learned from its implementation will guide the development of data collection and After Action Review (AAR) aids for the Close Combat Tactical Trainer (CCTT). In addition, the UPAS will be modified, as necessary, to support research on (1) the application of DIS to joint service close air support training and (2) the use of knowledge databases to guide the preparation of AAR aids automatically. Incorporation of results of other exploratory development programs on effective DIS instructional features, feedback, sequencing and pacing, and use of massed vs. distributed practice (e.g., the DESYNE project) will form the basis of a methodology for developing prototype training programs and their scenarios.

**IMPACT:** Results of this research task will help STRICOM and TRADOC to ensure that the CCTT and other DIS training systems provide units with the simulated operational experiences that meet their training needs.

**PROPONENT/SPONSOR:** Simulation, Training and Instrumentation Command (STRICOM), AMC; TRADOC System Manager for Combined Arms Tactical Trainer (TSM CATT), TRADOC; Defense Modeling and Simulations Office, OSD

**TECHNOLOGY TRANSFER:**

**Progress:** In FY92, the prototype UPAS was accepted in OSD as the design objective for the DOD DIS performance measurement standard, and recommended for implementation with SIMNET by TSM, CATT. In FY93, UPAS software and user's guide for collecting and analyzing data from SIMNET was transferred to STRICOM and TRADOC for implementation at the Fort Knox Combined Arms Tactical Training Center (CATTC). In FY94 an upgraded version of UPAS was demonstrated and transferred to STRICOM, TRADOC and OSD. Modifications were made in UPAS to contain data displays for close air support (CAS) training.

**Future Products:** In FY95, a work-station-based version of UPAS that guides the preparation of After Action Review aids automatically using a knowledge database will be transferred to STRICOM and TRADOC. In FY96, guidance for generating realistic tactical scenario options for training in CCTT will be transferred to STRICOM and TRADOC. Prototype DIS training modules will be transferred to demonstrate the methodology - for Special Operations Forces mission planning in FY97; and for dismounted infantry in FY98. By FY98, guidelines for employing effective instructional features and strategies will be incorporated in a tested and validated DIS training support package, for use by DIS training and materiel developers.

**FY95 MILESTONES:**

Implement and test the capability of the Automated Training Analysis and Feedback System (ATAFS) to generate AAR aids

Integrate concepts for measuring performance above company level in DIS environments

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

III.Q.2 Unit Training Strategies

**TECHNOLOGY DEMONSTRATION:**

Unit Performance Assessment System Demonstrated - FY94

**DEFENSE TECHNOLOGY AREA:** Training Systems

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**START DATE:** FY92

**END DATE:** FY98

**FY95 FUNDING (\$000):** \$272    **PROGRAM ELEMENT/PROJECT:** 63007 A793

**DIVISION:** Training Systems Research Division

**RESEARCH UNIT:**

Simulator Systems

**ACTIVITY:**

**AMC (STRICOM)**

**ARI**

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**PM CATT**

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**TRADOC (TSM CATT)**

**COL Robert White**

**TSM CATT**

**DSN 464-1600**

**TASK TITLE: STRONGARM: Strategies for Training and Assessing Armor Commanders' Performance with Devices and Simulations (2124)**

**OBJECTIVE:** To provide the empirical basis for identifying mixes of armored unit training resources that best match current and future requirements and enhance readiness.

**APPROACH:** To provide an empirical foundation for armor training strategies, research will be conducted to assess the tasks and skills that can be trained with gunnery and maneuver training aids, devices, simulators, and simulations (TADSS). The research will include development of analytic and empirical methods for assessing and projecting the training capabilities of specific TADSS, and the development of a prototype simulation-based armor training program. These efforts will support development and refinement of semi-automated performance measurement systems (such as the Unit Performance Assessment System (UPAS)); development and validation of required levels of proficiency ("gates"), and development and evaluation of alternative TADSS-based training methods. Future needs for TADSS will be identified through close monitoring of related technology-based research and results of training with fielded TADSS. Analytic methods will be applied to project appropriate mixes of resources in future training strategies.

**IMPACT:** This research will provide information necessary for building and validating armor training strategies. It will provide a foundation for training strategies based on more than listings of projected resources and events. The payoff should be more effective and efficient TADSS-based strategies not only for armor training, but also for combined arms training.

**PROPONENT/SPONSOR:** U.S. Army Armor School (USAARMS), TRADOC; 16th Cavalry Regiment/Armored Warfighting Training Directorate (AWTD), Combined Arms Training Strategies Division and 5th Squadron (Specialty Training and Simulation Squadron)

**TECHNOLOGY TRANSFER:**

**Progress:** As part of the Combined Arms Training Strategy (CATS), the U.S. Army Armor School (USAARMS) is refining descriptive strategies for supporting gunnery and maneuver training events and providing a framework for the increasing use of TADSS. Research support for this effort has included: development of an extensive simulation-based training program for armor units; development of analytic and empirical methods for assessing the training capabilities of TADSS; determination of the training capabilities of selected TADSS; and determination of user requirements for a prototype simulation-based performance measurement system (UPAS). A comprehensive prototype simulation-based (primarily SIMNET) program focused on training Army National Guard (ARNG) armor units was developed. Measures were developed and baseline data were collected for assessing the effectiveness of alternative simulation-based training methods (e.g., use of enhanced feedback, provision of demonstrations of successful performance) within the context of the ARNG training program.

Future Products: Development of a Simulation Networking (SIMNET) training program and associated training methods will provide a prototype training program and strategy for the Close Combat Tactical Trainer (CCTT) in FY95. Research on application of UPAS will lead to an enhanced simulation-based performance measurement system in FY95. Development of assessment methods and determination of the training capabilities of future TADSS as they become available will continue to provide input for the refinement of the armor portion of CATS. A methodology for defining and validating future training strategies will be transferred to USAARMS in FY98 for use in designing armor training strategies as part of CATS.

**FY95 MILESTONES:**

Assess/refine methods for exporting portions of Army National Guard (ARNG) simulation-based training program, including integration with home-station training

Refine observer/controller (O/C) methods and tools for monitoring training and supporting after action reviews (AARs) in SIMNET/Close Combat Tactical Trainer (CCTT)

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**III.Q.2 Unit Training Strategies**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY92                      END DATE: FY98**

**FY95 FUNDING (\$000): \$524      PROGRAM ELEMENT/PROJECT: 63007 A793**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Armored Forces**

**ACTIVITY:                      TRADOC (USAARMS)      ARI**

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**TASK TITLE: TRAIN-UP: Technology-Based Reserve Component (RC) Training Strategies (2125)**

**OBJECTIVE:** To devise and demonstrate technology-based training strategies which enhance the effectiveness and efficiency of training RC units with low Operating Tempo (OPTEMPO) at widely dispersed locations.

**APPROACH:** Prototype training strategies with the potential for meeting training requirements within RC constraints (e.g., limited training time, unit/soldier geographical dispersion) will be identified, developed, and evaluated. Appropriate usage (mixing and matching) of different training aids, devices, simulators, and simulations (TADSS), e.g., M-COFT, GUARDFIST I, CCTT, M-SIMNET, and distributed training technologies (e.g., computer conferencing, video teletraining), will be empirically tested using Army National Guard and Army Reserve soldiers/units. Data to be collected will include: soldier, crew, and unit proficiency indicators; commander performance measures; scheduling efficiency information; training attitudes; and estimated training resource requirements. Results will be coordinated with the Combined Arms Training Strategies (CATS) proponents at TRADOC and proponent schools, the National Guard Bureau, OCAR, and FORSCOM.

**IMPACT:** Research results will have direct and immediate applicability to the ARPA Advanced Simulations Project, Armor Training Device Strategy, the Combined Arms Training Strategy, and decisions concerning the acquisition and fielding of different TADSS and distributed training technologies.

**PROPONENT/SPONSOR:** National Guard Bureau (NGB), DA; Office, Chief of Army Reserve (OCAR), DA; FORSCOM, HQ

**TECHNOLOGY TRANSFER:**

**Progress:** A plan was approved by the NGB to establish a longitudinal database of home-station RC performance and personnel measures. Analyses of NTC National Guard data determined which areas were most deficient and therefore should be the focus for improving home-station training. Findings were reported on the relationship of GUARDFIST and MCOFT training to live fire performance. The effectiveness and efficiency of selected RC-operated LANES training was assessed; findings and recommendations for the operation of LANES training by the RC were presented to FORSCOM, OCAR and the NGB. A compressed, TADSS-based, tank gunnery training strategy for the RC was developed.

**Future Products:** By FY95, the longitudinal database of RC training and personnel measures will be established and initial analyses performed. Empirical research findings leading to a recommended maneuver training strategy for the RC will be presented in FY98 to proponents.



**FY95 MILESTONES:**

Establish longitudinal database and collect RC unit and individual/crew data

Complete initial longitudinal analyses

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**III.Q.2 Unit Training Strategies**

TECHNOLOGY DEMONSTRATION: N/A

DEFENSE TECHNOLOGY AREA: Training Systems

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START DATE: FY93

END DATE: FY98

FY95 FUNDING (\$000): \$326 PROGRAM ELEMENT/PROJECT: 63007 A793

DIVISION: Training Systems Research Division

**RESEARCH UNIT:**

**Reserve Component Training**

ACTIVITY:

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**TASK TITLE: COMBAT: Combined Arms Training Strategies (2126)**

**OBJECTIVE:** To develop and demonstrate cost-effective training strategies for combined arms brigade and battalion training.

**APPROACH:** Recent research has provided a wealth of information on combined arms training. This includes information on: high-performing units at the Combat Training Centers; surveys on training in the Army conducted in support of the Combined Arms Training Strategy (CATS); as well as an extensive front-end analysis of combined arms tasks. This information will be supplemented by additional research to develop sets of field tested and proven "good ideas" and strategies for combined arms training. Innovative training methods and training management strategies -- as well as aviation, armor and RC training strategy components resulting from other ARI research -- will be synthesized and then field-tested.

**IMPACT:** Empirically-based, field-proven training methods and strategies will provide the Army with information which will help commanders to design and schedule combined arms unit training programs to meet their mission requirements.

**PROPONENT/SPONSOR:** Combined Arms Command-Training (CAC-T), TRADOC

**TECHNOLOGY TRANSFER:**

**Progress:** A report describing the field implementation of TRADOC guidance concerning CATS was completed and submitted to the sponsor. The task analysis approach in terms of content, format, and concept for the Critical Combat Functions (CCF) was approved by the sponsor. Key elements for the training and assessment of CCFs were identified. Structures and task analyses for CCFs were completed.

**Future Products:** Field-tested, experimental combined arms training strategies will be presented to TRADOC (CAC-T) by the end of FY98, with recommendations for their implementation as part of future battalion and brigade CATS.

**FY95 MILESTONES:**

Update and refine CCFs based on new developments and inputs from the field

Conduct limited tryouts of combined arms training strategies incorporating CCFs

Refine combined arms training methods and strategies based on inputs from the field

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

**III.Q.2 Unit Training Strategies**

**TECHNOLOGY DEMONSTRATION: N/A**

**DEFENSE TECHNOLOGY AREA: Training Systems**

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**START DATE: FY93**

**END DATE: FY98**

**FY95 FUNDING (\$000): \$263    PROGRAM ELEMENT/PROJECT: 63007 A793**

**DIVISION: Training Systems Research Division**

**RESEARCH UNIT:**

**Unit-Collective Training**

**ACTIVITY:**

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**ARI**

**POC:**

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**TASK TITLE: LIC-T: Improving Light Forces Low Intensity Conflict Training for Operations Other Than War (2127)**

**OBJECTIVE:** To develop Low Intensity Conflict (LIC) unit command and control immersion training environments that clarify the dynamic rules of engagement by replicating the response time demands and ambiguities associated with operations other than war (OOTW). To develop and evaluate prototype training strategies for light forces contingency operations.

**APPROACH:** Knowledge and experience acquired from previous research with light forces, reserve component command and staff, and JRTC performance measurement methodology development will be applied in a training needs analysis of OOTW. Critical issues identified by Dismounted Battlespace Battle Lab (DBBL) and light forces proponents, will be considered. An in-depth review will be conducted of problems experienced and anticipated by Infantry units as they transition to peacekeeping missions, conduct them under conditions that vary from civilian police work to overt warfare, and then transition back to preparation for traditional combat operations. It is anticipated that specialized training to enable relatively long-term goal shifting (here on the order of months) and rapid shifting (as when a security "police" patrol gets caught in a fire fight) will need to be developed, and that immersion training environments using distributed interactive simulations (DIS) for individual combatants will be designed and developed as potential solutions. Light Infantry subject matter experts, unit observations, and the assessment of performance feedback from the Joint Readiness Training Center (JRTC) will be used to refine specific OOTW training and performance assessment methodologies. The research will be performed in collaboration with light forces proponents, the JRTC, and sponsors to ensure validity, acceptance, and implementation of products.

**IMPACT:** The Army's Modernization Plan (May 1994) articulates the need for a well trained and flexible land force to provide dominance in an unpredictable, unstable and volatile world. By clarifying anticipated rules of engagement for OOTW, and developing effective DIS training methods for such operations, this dynamic light forces research program will support and enhance tactical unit readiness.

**PROPONENT/SPONSOR:** Combined Arms Command - Training (CAC-T), TRADOC; Joint Readiness Training Center (JRTC); Dismounted Battlespace Battle Lab, USAIC/TRADOC

**TECHNOLOGY TRANSFER:**

**Progress:** New Start

**Future Products:** The in-depth review of OOTW mission training needs based on light forces mission performance and judgments at JRTC will be completed by the end of FY95 and transferred to TRADOC and the DBBL for use in prioritizing training development requirements for Infantry and related light forces. Specific measurement methodologies of OOTW mission performance will be developed for use at the JRTC by FY96. By FY97 prototype light force unit training technologies (to include

distributed immersion training for battalion echelon contingency operations training (CONOPS) and distributed simulation for training the rules of engagement in OOTW). By the end of FY97 light forces unit training strategies for OOTW will be incorporated into a Combined Arms Training Strategy (CATS) for field validation and transfer to TRADOC.

#### **FY95 MILESTONES:**

Front-end analysis of peacekeeping and OOTW training requirements

Conduct an in-depth review of problems experienced and anticipated by Infantry units as they transition to peacekeeping missions occurring under varying conditions of overt violence and then resuming combat roles

Review and incorporate Dismounted Warfighting Battlespace and related light forces continuous operations issues reviewed and incorporated into research program plans

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#### **SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

III.Q.2 Unit Training Strategies

TECHNOLOGY DEMONSTRATION: N/A

DEFENSE TECHNOLOGY AREA: Training Systems

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START DATE: FY95

END DATE: FY98

FY95 FUNDING (\$000) \$586

PROGRAM ELEMENT/PROJECT: 63007 A793

DIVISION: Training Systems Research Division

RESEARCH UNIT:

Infantry Forces

ACTIVITY:

TRADOC (CAC-T) JRTC

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**TASK TITLE: AVIATES: Aviation Training Strategies for Improving Combat Readiness (2224)**

**OBJECTIVE:** To develop and demonstrate an aviation strategy for using training aids, devices, simulations and simulators (TADSS), as a major component of the Combined Arms Training Strategy (CATS) to ensure the combat readiness of aviators and aircrews, while reducing the load on expensive, high fidelity simulators and flying hours.

**APPROACH:** A detailed training requirements analysis will be performed to select candidate tasks as the focus of the research. These tasks will be paired with specific low-cost, part-task training devices to determine the transfer effectiveness of each device in training and sustaining specific aviation knowledge and skills. Using the results of this research, a prototype aviation training system and associated prototype training strategies will be configured. These training strategies will be compared experimentally using the variable fidelity features of the modular-based computer architecture in the Simulator Training Research Advanced Testbed for Aviation (STRATA).

**IMPACT:** Maximizing the use of low-cost training devices will ensure the optimal usage of full scale simulators as a skill and knowledge integrator, leaving virtually all flight hours available for combat mission training.

**PROPONENT/SPONSOR:** U.S. Army Aviation Center (USAAVNC), TRADOC

**TECHNOLOGY TRANSFER:**

**Progress:** Research plan for demonstrating/evaluating effective training systems and strategies using the STRATA simulator. A requirements model for modular, low cost devices based upon Air Force MH-53 total training system. Report on the requirements for low-cost, modular part-task training devices for both initial and advanced tactical skills training strategies and mission planning. Data collection completed on evaluation of a program of instruction which introduced pilots to infrared projected images prior to night vision goggle flight training. Completed requirements determination for low-cost training devices (e.g., OH-58).

**Future Products:** In FY98, the USAAVNC will be provided with an experimentally validated prototype aviation training strategy, to include: requirements for low-cost, part-task, tactics and combined arms trainers; and assessments of the impact of low-cost devices on combat readiness as measured using field and networked simulators. The USAAVNC will then use the results for developing future TADSS requirements and designing aviation training strategies as part of the prototype Combined Arms Training Strategy (CATS) to be validated by FY98.

**FY95 MILESTONES:**

Determine design tradeoffs for mission rehearsal and mission preview training devices

Develop the modular components for the total aviation training system

Evaluate selected components of the total aviation training system

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**SCIENCE AND TECHNOLOGY OBJECTIVE (STO):**

III.Q.2 Unit Training Strategies

**TECHNOLOGY DEMONSTRATION:** N/A

**DEFENSE TECHNOLOGY AREA:** Training Systems

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**START DATE:** FY92

**END DATE:** FY98

**FY95 FUNDING (\$000):** \$411     **PROGRAM ELEMENT/PROJECT:** 63007 A793

**DIVISION:** Training Systems Research Division

**RESEARCH UNIT:**

Rotary-Wing Aviation

**ACTIVITY:**

TRADOC (USAAVNC)

ARI

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## **APPENDIX C**

### **Science and Technology Objective (STO) Fact Sheets**



## STO III.Q.1 Soldier Assignment

Develop and demonstrate new initial entry enlisted selection and classification procedures that can potentially help reduce attrition by 15% and improve performance by as much as 10%. In FY96, demonstrate technologies to enhance selection of Special Operations/Low Intensity Conflict (SO/LIC) forces that can potentially reduce attrition by 25 percent.

Supports: DMPM-DCSPER; USASOC & USAJFKSWCS

FUNDING	PE	PROJ	95	96	97	98	99	00
	63007	A792	1241	854				

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### STO III.Q.2 Unit Training Strategies

By the end of FY98, this program will demonstrate a Combined Arms Training Strategy (CATS) based on empirical data which will provide practical guidance to unit commanders for selecting an effective, within budget, mix of: a) field training, including live fire; and b) training aids, devices, simulators, and simulations. The guidance will be incorporated in a computer program designed to facilitate the precise matching of training needs with training resources to enable preparation of highly effective unit training schedules, with a focus on the combined arms and light units, including reserve forces with designated contingency missions. In FY96, validate a training program designed for using Close Combat Tactical Trainer. In FY97, complete a preliminary CATS incorporating digitized synthetic environments for the combined arms and light forces.

Supports: TRADOC: CAC & TSM CATT; STRICOM: PM CATT; USAREUR: 7ATC

FUNDING	PE	PROJ	95	96	97	98	99	00
62785	A791		1246	1068	597	319		
63007	A793		2096	2169	2448	2690		
TOTAL			3342	3237	3045	3009		

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## STO IV.J.5 Combined Arms Training Strategy for Aviation

To develop by the end of FY98 a combined arms training strategy for aviation based on empirical data. A methodology will be developed and demonstrated that makes the most effective use of simulators, training devices and live exercises for initial flight skills through unit combat tasks. In FY96, develop and demonstrate a methodology for rapid evaluation and thorough assessment of on-hand and proposed training devices for unit training. Minimum fidelity requirements will be established for critical aircrew skills training and for utilization of, and upgrades to existing simulators. In FY97, the aviation combined arms team trainer (AVCATT) functional requirements will be validated.

Supports: US Army Aviation Center (USAAVNC); STRICOM; PM CATT (AVCATT); TSMS for Longbow, Comanche, Kiowa Warrior

FUNDING	PE	PROJ	95	96	97	98	99	00
62785	A791		1740	1268	1786	2023		
63007	A793		393	405	433	346		
TOTAL			2133	1673	2219	2369		

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## STO IV.J.6 Foreign Language Skill Training

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Future Army contingency missions to meet regional threats require that selected leaders and soldiers possess the language skills and knowledge essential for working along-side allies and against foreign enemies. By end of FY95, demonstrate a portable ("notebook" size) computer-based tutor for intermediate level foreign language training incorporating emerging computing technologies and recent advances in cognitive learning theories.

Supports: USAIC & School; DCSINT; INSCOM; USMA; USASOC

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FUNDING	PE	PROJ	95	96	97	98	99	00
	62785	A791	324					

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## STO IV.J.8 Cognitive and Collective Skill Retention

To ensure a combat-ready force, individual cognitive skills and collective skills must be maintained. By end of FY95, individual skill reacquisition models will be developed and demonstrated which will predict the amount of retraining necessary to attain individual skill proficiency, as a function of task characteristics, separation intervals and personnel variables (e.g., AFQT scores). By the end of FY95, a task performance model will be developed and demonstrated for predicting the acquisition and decay of small unit collective skills as a function of task characteristics and other variables.

Supports: ODCSPER (Mobilization Directorate); Army Reserve Personnel Center (Mobilization Training); TRADOC (Training Operation Management).

FUNDING	PE	PROJ	95	96	97	98	99	00
	62785	A791						365

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## STO IV.J.9 Human Dimensions of Battle Command

In FY87, provide training guidelines for commanders to harness available and projected information technologies to support effective command (e.g., situation assessment, communication of intent). In FY88 identify organizational design principles, and techniques and procedures to support distributed decision making. Demonstrate a significant improvement in tactical decision skills by commanders and staff in a realistic exercise (e.g., Prairie Warrior exercise) compared to baseline performance (i.e., data gathered from exercises and experiments during period of FY89-94). By end of FY99, provide tools, techniques, and procedures for developing, training, and maintaining commanders' requisite knowledge and skills.

Supports: CAC-T; Battle Command Battle Lab; Center for Army Lessons Learned; Center for Army Leadership

FUNDING	PE	PROJ	95	96	97	98	99	00
62785	A790		1416	837	668	515		
63007	A792		1319	1422	1468	1164		
TOTAL			2735	2259	2134	1679		

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## **APPENDIX D**

### **Manpower, Personnel and Training Program Time Lines**

## HUMAN RESOURCE DEVELOPMENT

### Leader/Organizational Development

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
1111: LEADER TECH: Leader Skill Assessment and Development Technologies						
	1115: LEADER SPECS: Leader Development Requirements and Organizational Performance					
1122: BATTLE COMMAND: Improving Commander and Staff Effectiveness						
	1124: Controlling Organizational Change					

### Career Development and Retention

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
1311: LIFELINE: The Life Course Approach to Human Resources Development Processes						
				1322: Techniques to Enhance Personnel Decision Making		
1223: Special Forces: Improving Special Forces Personnel Selection and Management						
	1224: SPECIAL FORCES: Special Forces Personnel Development					

### LEGEND:

Exploratory Development (6.2) Task	Advanced Development (6.3A) Task
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## SELECTION AND CLASSIFICATION

### General Selection and Classification Techniques

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
<b>1212: CAREER FORCE: Building the Career Force</b>						
<b>1213: NEW MOS: Military Occupational Specialty (MOS) Restructuring</b>						
<b>1217: NEW SOLDIER: Integrated Selection and Assignment in New Personnel Systems</b>						

### Specialized Selection and Classification Techniques

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
<b>1211: QUALITY SOLDIERS: Alternative Selection and Evaluation Techniques</b>						
<b>1216: Job Classification</b>						
<b>1221: JOB MATCH: Determining Minimal Entry Qualifications</b>						
<b>1222: TOMORROW'S WARRIOR: Army Selection and Classification: General Models and MOS-Specific Needs</b>						
<b>1225: ARMY AVIATOR: Integrated System for Selection and Classification of Aviator Candidates</b>						

### LEGEND:

Exploratory Development (6.2) Task	Advanced Development (6.3A) Task
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## UNIT COLLECTIVE TRAINING

### Synthetic Training Environments

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
2111: VIRTUE: Virtual Environments for Combat Training and Mission Rehearsal					2117: VIRTUE II	
2112: RECOLLECT: Acquisition and Retention of Collective Skills in Synthetic Training Environments						
2113: DESYNE: Technology for Designing Collective Training in Synthetic Environments						
		2116: PREMO: Pre-Mobilization Training Technologies for Skill Sustainment and Reacquisition			211A: PREMO II	
2114: SYNTRAIN: Development of Advanced Training Technologies for Distributed Interactive Simulation (DIS) Systems					2218: SYNTRAIN II	
		2119: TAMPIT: Technologies for Advanced Military Police Immersion Training				

### Unit Training Strategies

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
2122: MOSES: Military Operational Simulation and Evaluation Systems			2129: JOSHUA: Joint Operations Simulation of Hostile Unit Aggression		212D: JERICO: Joint Engagement Requirements for Instruction in Combined Operations	
	2127: LIC-T: Improving Light Forces Low Intensity Conflict Training for Operations Other Than War				212C: LIC-T II	
2124: STRONGARM: Strategies for Training and Assessing Armor Commanders' Performance with Devices and Simulations						
2125: TRAIN-UP: Technology-Based Reserve Component (RC) Training Strategies					212B: TRAIN-UP II	
2126: COMBAT: Combined Arms Training Strategies					2128: UNIT-T Unit Training Technology	
2224: AVIATES: Aviation Training Strategies for Improving Combat Readiness					2227: AVIATES II	

### LEGEND:

Exploratory Development (6.2) Task	Advanced Development (6.3A) Task
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## LAND WARFARE AND ROTARY WING TRAINING

### Task Training Fidelity Requirements

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
2211: STRATA-FI: Simulation Fidelity Requirements for Cost-Effective Aviation Training						2212: STRATA-FI II

### Combat Skills Training Methods and Strategies

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
2221: TANTAMOUNT: Technologies for Advanced Mounted Warfare Training						
2223: NIGHTFIGHTER: Training Technologies for Night Operations				222B: NIGHTFIGHTER II		
				2226: DISMOUNT: Distributed Training Technologies for Mission Rehearsal in Multi-National Airland Operations		

### Foreign Language Tutoring Technologies

PRIOR YEARS	FY95	FY96	FY97	FY98	FY99	FY00 +
2231: MULTI-LINGUAL: Advanced Technologies for Mastering Foreign Languages						

### LEGEND:

Exploratory Development (6.2) Task	Advanced Development (6.3A) Task
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